Overview of Scripting and Preparation of Publications with JPSP: Proceedings and Program(me) Booklet

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JPSP: What Is It?

- JACoW Proceedings Scripts Package
  - VPL (Volker Public License) set of proceedings scripts
- Version 0.6 (first in version history): 22 Apr 2003
- Now Version 23.0 (Mac platform): 28 Sep 2015

```
[wlan2-151:COOL15-Volker/t/SCS2015-150929] satogata% wc -l *.pl
     307 generate_toc-110525.pl
   11606 spmsbatch-150928.pl
     411 spmsread-140325.pl
     242 spmsreadrearrange-100410.pl
   12566 total
```

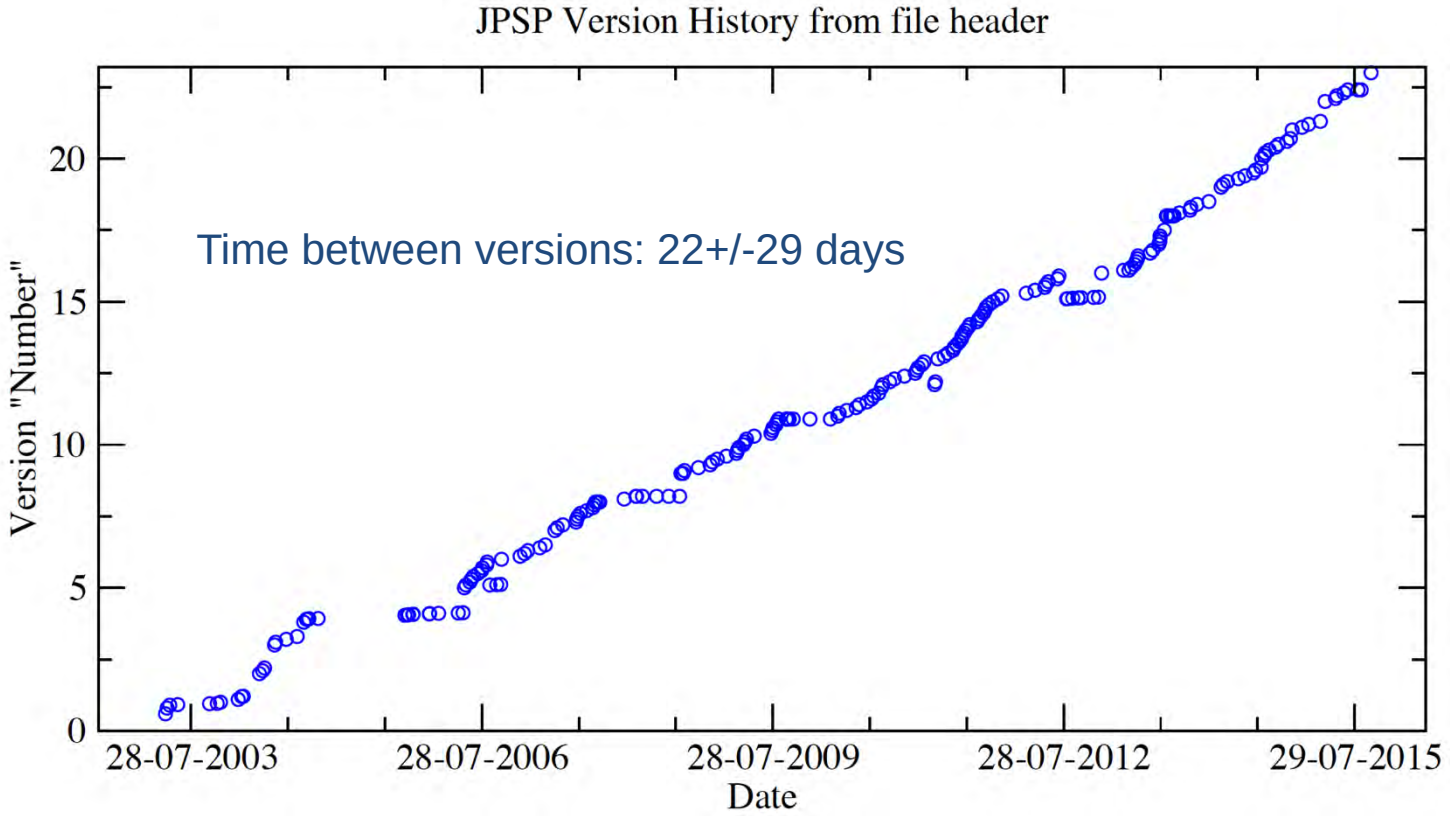
Date of this version e.g. 2015-09-28

12,000+ lines of Perl code

```
v0.6  22. Apr 2003  volker rw schaa
v0.8  28. Apr 2003  volker rw schaa
v0.9  08. May 2003  volker rw schaa
v0.92 07. Jun 2003  volker rw schaa  sort order cor
v0.95 05. Oct 2003  volker rw schaa  coloring of au
                                     and institutes
v0.96 03. Nov 2003  volker rw schaa  config file de
v1.0  15. Nov 2003  volker rw schaa  some minor nui
v1.1  21. Jan 2004  volker rw schaa  read additiona
v1.2  03. Feb 2004  volker rw schaa  abstracts will
                                     (in addition t
v1.21 09. Feb 2004  volker rw schaa  change of some
                                     into flushleft
v2.0  10. Apr 2004  volker rw schaa  adaption to ma
v2.1  22. Apr 2004  volker rw schaa  nearly full ad
                                     start of docum
v2.2  29. Apr 2004  volker rw schaa  second stage o
                                     abstracts now
```

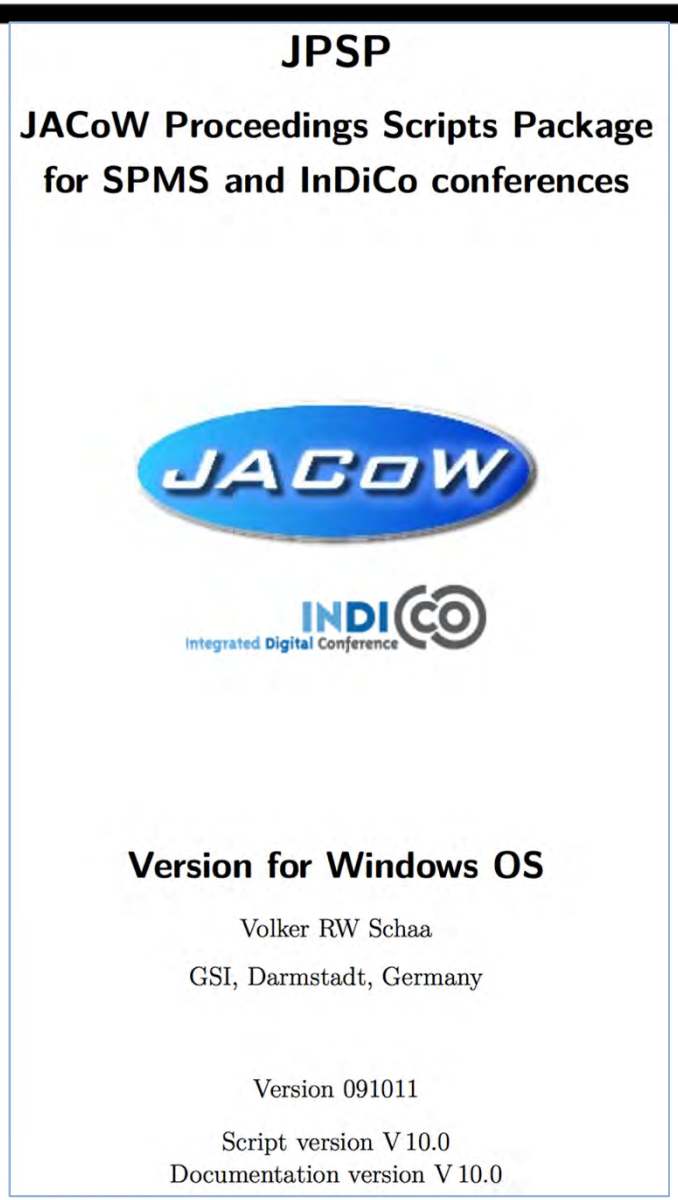
Extensive detailed version history in code headers

JPSP Development



- Development history of JPSP scripts
  - Lesson: If your version is >1 month old, it's out of date
    - This means my version from Sep 28 is probably out of date!
  - Volker alone is the source for new versions
  - Raphael and I nag him to put new versions on Sourceforge/wiki

Excellent (but Outdated) Documentation



JPSP

JACoW Proceedings Scripts Package for SPMS and InDiCo conferences

JACoW

INDICO Integrated Digital Conference

Version for Windows OS

Volker RW Schaa

GSI, Darmstadt, Germany

Version 091011

Script version V 10.0
Documentation version V 10.0

- http://www.jacow.org/index.php?n=Tools.Scripts
- Note the date! (2010!)
- Scripts are embedded as a zip file within the PDF for the manual
- Newer versions (2013-11-18) of scripts are available on JACoW.org website above

Software Requirements

- We have recently made the scripts work on Macs (well, Todd's Mac), Windows, and Linux installations
- The truly critical packages from above are
  - perl, LaTeX, wget, pdf utilities
  - LaTeX should include ConTeXT for program guide
  - It helps greatly if you are a perl and TeX/LaTeX hacker

The Documentation Works Very Well

- The documentation is **extremely** good IF
  - You carefully follow it step by step
  - Your system software is installed properly
  - You set up the configuration file correctly
    - Includes ISBN info
    - Includes conference details
    - Includes SPMS details like passphrases

3 JACoW Scripts and Command Procedures

The general setup and the execution of the JACoW scripts are first listed in sequence and described in detail later.

❶ Setup of local site for JACoW scripts

① Setup scripts and base directories with SCS2009.ZIPPED (↪ section 3.1)

② Adapt the configuration file »`conference.config`« to your needs (↪ section 3.2)

❷ Pre-conference run (↪ section 4.1)

① Download the conference XML file from SPMS or InDiCo (↪ section 3.3)

② For the production of an Abstract booklet run the »`spmsbatch.pl`« script to generate the source input for the Abstract booklet (↪ section 3.4)

③ Start ConTEXt (it's a variant of TEX like LATEX) to compile the generated files and produce an Abstract booklet ↪ section 4.2)

❸ Production run (↪ section 4.1)

① Download the conference XML file from SPMS or InDiCo, make sure for SPMS conferences that after »`Final QA`« paper TOC values have been generated (↪ section 3.8.1), for InDiCo conferences see item ③ (↪ section 3.3)

② Use the batch file »`pdfwget.bat`« to download the PDF files of the edited papers, the transparencies and posters from SPMS or InDiCo. The files will be placed automatically in the correct directory (papers into »`raw_paper_directory`«, transparencies into »`slides_directory`« and posters in »`posters_directory`«) (↪ section 3.5)

③ For InDiCo conferences generate now page count and TOC values using the script »`generate_toc.pl`« (↪ section 3.8.2)

④ Run the script »`pagecheck.pl`« to compare the number of pages a pdf file has in the SPMS database against the real pdf file, find deviations in page count, paper size, PDF version, font inclusion from the JACoW standard (↪ section 5.2)

⑤ Run the script »`scan-keywords.pl`« to generate the list of used keywords (↪ section 3.7)

⑥ Run the script »`spmsbatch.pl`« to generate web pages, the TEX files for the proceedings volume and to package the papers from »`./PAPERS-FINAL`« (↪ section 3.4)

⑦ Run the command file »`gen_texpdf.bat`« in »`./papers`« to package the raw files (adding page numbers, header and footer lines, fill hidden fields with keywords, etc.) (↪ section 3.6)

⑧ Rerun the script »`spmsbatch.pl`« again to make sure that all links are generated.

⑨ Copy all files `./papers/*.pdf`, `./html/*.*`, `./talks/*.pdf`, `./audio/*.mp3` and `./posters/*.pdf`, and the final »`index.htm`« to the webserver directories

❹ Check of consistency (↪ section 5)

① Check the generated pdf files for completeness (↪ section 5.1)

② Use `Xenu` to check the script generated web pages for broken links and orphan files (↪ section 5.3)

❺ Compare all errors that have occurred and could not be explained to the ones documented in section »`Known Bugs`« (↪ section 8).

JPSP Example: IBIC15 Configuration

```
# post-conference setup
#---------------------
#            _pub_date  year and month (numerical) of publication on JACoW, i.e. "2012-10"
#
conference_SPMS      = https://spms.kek.jp/pls/ibic2015/
conference_xmlfile   = spms.xml
#********************
# OS platform
#
#-----------------
#   os_platform
#            Windows    will use syntax for MS Windows copy/delete
#            Linux      uses cp/rm
#            MACOS      uses cp/rm
#
os_platform          = MACOS                        # Windows or Linux/MAC OS
#********************
# Conference parameters
#
conference_logo      = logo-sm.png
conference_logo_size = 477x129                                  # real logo size can be scaled by these numbers
conference_url       = http://jacow.org/IBIC2015/               # where it will appear at JACoW (used for Inspire dataset)
conference_respm     = v.r.w.schaa@gsi.de
conference_name      = IBIC2015
conference_site      = Melbourne, Australia
conference_title     = 4th International Beam Instrumentation Conference
conference_date      = 13-17 September 2015
conference_longname  = 4th International Beam Instrumentation Conference, Melbourne, Australia, 13-17 September 2015
conference_series    = International Beam Instrumentation Conference
conference_number    = 4
conference_editor    = "Schaa, Volker RW (GSI, Darmstadt, Germany)"
conference_isbn      = 978-3-95450-176-2                        # ask Volker!!
conference_pub_date  = 2015-12                                  # 2012-10
conference_pub_by    = JACoW
conference_pub_copyr = Copyright \copyright{} 2015 CC-BY-3.0 and by the respective authors
#********************
```

JPSP Example: IBIC'15 XML Download

```
[wlan2-151:COOL15-Volker/t/SCS2015-150929] satogata% perl spmsread-140325.pl
I found 0 command-line argument(s).

 This is version  3.5 of 25 March 2014
 config file 'conference.config' found!

>>
>> reading from URL: https://spms.kek.jp/pls/ibic2015
>>


 xml file from config is: 'spms.xml'
 File ->./XML/spms.xml<- is new!
--2015-11-17 17:56:27--  https://spms.kek.jp/pls/ibic2015/spms_summary.xml
Resolving spms.kek.jp (spms.kek.jp)... 130.87.104.79
Connecting to spms.kek.jp (spms.kek.jp)|130.87.104.79|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: unspecified [text/xml]
Saving to: './XML/spms_summary.xml'

./XML/spms_summary.xml                  [ <=>                                   ]   1.76K  --.-KB/s   in 0s

2015-11-17 17:56:30 (28.6 MB/s) - './XML/spms_summary.xml' saved [1798]


 basic spms file './XML/spms_summary.xml' found!
 loading xml file for session MOMA
--2015-11-17 17:56:30--  https://spms.kek.jp/pls/ibic2015/xml2.session?sid=MOMA
Resolving spms.kek.jp (spms.kek.jp)... 130.87.104.79
Connecting to spms.kek.jp (spms.kek.jp)|130.87.104.79|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: unspecified [text/xml]
Saving to: './XML/MOMA.xml'

./XML/MOMA.xml                          [ <=>                                   ]   1.10K  --.-KB/s   in 0s
```

Reading session XML files

~1 minute, downloads 21 XML files from SPMS to XML directory using wget

JPSP Example: IBIC'15 spmsbatch

```
[wlan2-151:COOL15-Volker/t/SCS2015-150929] satogata% perl spmsbatch-150928.pl
you are using ---> v 22.0 - 23.0-28 sep 2015 vrws
 config file 'conference.config' found!
          OS platform     = darwin
          OS platform id  = 0
 conference_pub_by JACoW
 config file points to './XML/spms.xml'
 logo: 477 x 129
 no Code&Location file found on line 187
 going to close session [' 0':MOMA  ] [chairs :1] : Opening
 going to close session [' 1':MOALA ] [chairs :1] : Introduction
 going to close session [' 2':MOBLA ] [chairs :1] : Overview and Commissioning
 going to close session [' 3':MOCLA ] [chairs :1] : Time Resolved Diagnostics and Synchronization
--> Papercode: mopb023 ### Documentname: paper_mopb023.doc
--> Papercode: mopb023 ### Documentname: paper_mopb023.doc
--> Papercode: mopb049 ### Documentname: mopb049_paper.tex
 going to close session [' 4':MOPB  ] [chairs :0] : Poster Session 1
 going to close session [' 5':TUALA ] [chairs :1] : Tutorial 1
 going to close session [' 6':TUBLA ] [chairs :1] : BPMs and Beam Stability
 going to close session [' 7':TUCLA ] [chairs :1] : Transverse Profile Monitors
--> Papercode: tupb052 ### Documentname: tupb052_proceedings.doc
--> Papercode: tupb052 ### Documentname: tupb052_proceedings_v1.doc
--> Papercode: tupb059 ### Documentname: paper_tupb059.tex
--> Papercode: tupb072 ### Documentname: wedla02.tex
 going to close session [' 8':TUPB  ] [chairs :0] : Poster Session 2
 going to close session [' 9':TUMA  ] [chairs :1] : Public Lecture - Shared Views of the Southern Sky
 going to close session ['10':WEALA ] [chairs :1] : Tutorial 2
 going to close session ['11':WEBLA ] [chairs :1] : Beam Loss Detection
 going to close session ['12':WECLA ] [chairs :1] : Beam Charge Monitors and Other Instruments
 going to close session ['13':WEDLA ] [chairs :1] : Contributed Orals
 going to close session ['14':WETMCG] [chairs :0] : MCG Tour (Optional)
 going to close session ['15':WEDMCG] [chairs :0] : Conference Dinner at MCG
 going to close session ['16':THALA ] [chairs :1] : Tutorial 3
 going to close session ['17':THBLA ] [chairs :1] : Closing Session
 going to close session ['18':THTAS ] [chairs :0] : Tour of Australian Synchrotron

Conference XML 'IBIC2015' closed
```

Session details in order

Writes other scripts that are used later

JPSP Example: IBIC'15 pdfwget script

```
[wlan2-151:COOL15-Volker/t/SCS2015-150929] satogata% ./pdfwget.bat
--2015-11-17 18:08:03--  https://jacowfs.jlab.org/cgi-bin/ibic15/editor.zipdownload?paper_id=MOALA01&wanted_file=MOALA01_TALK.PDF&hcheck=601165ec9157d9b96cb5
a67b867cd5ce
Resolving jacowfs.jlab.org (jacowfs.jlab.org)... 129.57.64.51
Connecting to jacowfs.jlab.org (jacowfs.jlab.org)|129.57.64.51|:443... connected.
WARNING: The certificate of 'jacowfs.jlab.org' is not trusted.
WARNING: The certificate of 'jacowfs.jlab.org' hasn't got a known issuer.
HTTP request sent, awaiting response... 200 OK
Length: unspecified [application/octet-stream]
Saving to: 'moala01_talk.pdf'

moala01_talk.pdf                        [                                <=>                                 ]  35.59M   217KB/s   in 2m 36s

2015-11-17 18:10:41 (233 KB/s) - 'moala01_talk.pdf' saved [37316497]

--2015-11-17 18:10:41--  https://jacowfs.jlab.org/cgi-bin/ibic15/editor.zipdownload?paper_id=MOALA02&wanted_file=MOALA02_TALK.PDF&hcheck=bb987a2f242c7006b057
8c14e2a24420
Resolving jacowfs.jlab.org (jacowfs.jlab.org)... 129.57.64.51
Connecting to jacowfs.jlab.org (jacowfs.jlab.org)|129.57.64.51|:443... connected.
WARNING: The certificate of 'jacowfs.jlab.org' is not trusted.
WARNING: The certificate of 'jacowfs.jlab.org' hasn't got a known issuer.
HTTP request sent, awaiting response... 200 OK
Length: unspecified [application/octet-stream]
Saving to: 'moala02_talk.pdf'

moala02_talk.pdf                        [          <=>                                                       ]   7.03M   240KB/s
```

215 KB/s from my hotel room. Ouch!

2.5 minutes to download 35.6 Mb talk

- Make sure you have adequate bandwidth to server
- You will be downloading ALL the papers and talks to process them into the proceedings
- 1 hour later…

JPSP Example: IBIC'15 pagecheck script

```
[wlan2-151:t/SCS2015-150929/PAPERS-FINAL] satogata% perl pagecheck-150929.pl
Num arg (0)
reading pdfs from directory: ./
reading #pages from: './pages_per_paper.txt'
line #Serv=https://spms.kek.jp/pls/ibic2015/;Up=Uws8DCwFwvnOZJnJgSUevSNU;
Serv: https://spms.kek.jp/pls/ibic2015/
Pass: Uws8DCwFwvnOZJnJgSUevSNU
 [   1] 1115=   MOALA01 ==>  0 (Edi:   QA:   Status: )
 [   2] 1112=   MOALA02 ==>  0 (Edi:   QA:   Status: )
 [   3] 1102=   MOBLA01 ==>  7 (Edi: Evelyn Akers  QA: Kathleen Riches  Status: Green)
 [   4] 1301=   MOBLA02 ==>  4 (Edi: Andreas Moll  QA: Evelyn Akers  Status: Green)
 [   5] 1420=   MOBLA03 ==>  8 (Edi: David Taylor Button  QA: David Taylor Button  Status: Green)
 [   6] 1104=   MOCLA01 ==>  5 (Edi: Volker RW Schaa  QA: David Lopez Nonell  Status: Green)
 [   7] 1361=   MOCLA02 ==>  5 (Edi: Evelyn Akers  QA: Kathleen Riches  Status: Green)
 [   8] 1377=   MOCLA03 ==>  0 (Edi:   QA:   Status: )
 [   9] 1533=   MOPB001 ==>  3 (Edi: Andreas Moll  QA: Kathleen Riches  Status: Green)
 [  10] 1447=   MOPB002 ==>  8 (Edi: Simon Cunningham  QA: David Taylor Button  Status: Green)
 [  11] 1548=   MOPB004 ==>  0 (Edi:   QA:   Status: )
 [  12] 1457=   MOPB005 ==>  0 (Edi:   QA:   Status: )
 [  13] 1458=   MOPB006 ==>  8 (Edi: David Taylor Button  QA: Kathleen Riches  Status: Green)
 [  14] 1480=   MOPB007 ==>  5 (Edi: Evelyn Akers  QA: Kathleen Riches  Status: Green)
 [  15] 1471=   MOPB009 ==>  3 (Edi: Evelyn Akers  QA: Magdalena Montes-Loera  Status: Green)
 [  16] 1390=   MOPB011 ==>  8 (Edi: David Taylor Button  QA: Kathleen Riches  Status: Green)
 [  17] 1365=   MOPB012 ==>  4 (Edi: Volker RW Schaa  QA: Evelyn Akers  Status: Green)
 [  18] 1478=   MOPB013 ==>  5 (Edi: Simon Cunningham  QA: Evelyn Akers  Status: Green)
 [  19] 1488=   MOPB014 ==>  4 (Edi: David Taylor Button  QA: Kathleen Riches  Status: Green)
 [  20] 1522=   MOPB015 ==>  4 (Edi: David Taylor Button  QA: Evelyn Akers  Status: Green)
 [  21] 1537=   MOPB016 ==>  4 (Edi: David Taylor Button  QA: David Lopez Nonell  Status: Green)
 [  22] 1456=   MOPB017 ==>  5 (Edi: Volker RW Schaa  QA: Evelyn Akers  Status: Green)
 [  23] 1441=   MOPB018 ==>  5 (Edi: David Taylor Button  QA: Kathleen Riches  Status: Green)
 [  24] 1535=   MOPB019 ==>  0 (Edi:   QA:   Status: )
```

- The script that finds problems
  - Run daily in editorial room
- Also generates a script that fixes page number metadata in SPMS instance

```
[wlan2-151:t/SCS2015-150929/PAPERS-FINAL] satogata% more pagecheck-result_20151117-2330.txt
   MOBLA03   Editor: David Taylor Button
             Status  Green
             QA by   David Taylor Button
           # spms: 8, file: 5 pages
   MOPB002   Editor: Simon Cunningham
             Status  Green
             QA by   David Taylor Button
           # spms: 8, file: 3 pages
           # possible problems with non JACoW page size: '595 x 842'
   MOPB006   Editor: David Taylor Button
             Status  Green
             QA by   Kathleen Riches
           # spms: 8, file: 5 pages
   MOPB011   Editor: David Taylor Button
             Status  Green
             QA by   Kathleen Riches
           # spms: 8, file: 3 pages
   MOPB045   Editor: David Taylor Button
             Status  Green
             QA by   Kathleen Riches
           # spms: 8, file: 4 pages
   TUPB016   Editor: David Taylor Button
             Status  Green
             QA by   Kathleen Riches
           # spms: 8, file: 3 pages
   TUPB028   Editor: David Taylor Button
             Status  Green
             QA by   Kathleen Riches
           # spms: 8, file: 3 pages
   TUPB082   Editor: David Taylor Button
             Status  Green
             QA by   Kathleen Riches
           # spms: 8, file: 3 pages
   WEBLA02   Editor: Kathleen Riches
             Status  Green
             QA by   David Taylor Button
           # spms: 8, file: 5 pages
   WEBLA03   Editor: Volker RW Schaa
             Status  Green
             QA by   Simon Cunningham
             page count ok ( 5 pages)
           # #fonts  90
   WECLA02   Editor: David Taylor Button
             Status  Green
             QA by   David Taylor Button
           # spms: 8, file: 5 pages
   THALA01   Editor: David Taylor Button
             Status  Green
             QA by   Kathleen Riches
           # spms: 8, file: 7 pages
```

Page size problem

pages "problems"

fonts problem

JPSP Example: IBIC'15 boxcheck script

```
[wlan2-151:t/SCS2015-150929/PAPERS-FINAL] satogata% perl boxcheck-20150520.pl |& grep -v uninitialized
 MOBLA01.PDF  |1:    1    |2:   32    |3:    1    |4:   49    |5:   91    |6:   17    |7:    1    |total:   192
 MOBLA02.PDF  |1:    1    |2:    9    |3:    1    |4:    4    |total:    15
 MOBLA03.PDF  |1:    1    |2:   42    |3:    2    |4:    1    |5:    1    |total:    47
 MOCLA01.PDF  |1:    1    |2:    1    |3:    3    |4:    2    |5:    1    |total:     8
 MOCLA02.PDF  |1:    8    |2:   41    |3:  161    |4:  182    |5:  212    |total:   604
 MOPB001.PDF  |1:   93    |2:   71    |3:   51    |total:   215
 MOPB002.PDF  |1:  237    |2:   30    |3:   57    |total:   324
 MOPB006.PDF  |1:   24    |2:   18    |3:   13    |4:   45    |5:   43    |total:   143
 MOPB007.PDF  |1:  119    |2:  119    |3:    7    |4:    1    |5:    1    |total:   247
 MOPB009.PDF  |1:  121    |2:    1    |3:    1    |total:   123
 MOPB011.PDF  |1:  120    |2:    1    |3:  160    |total:   281
 MOPB012.PDF  |1:  225    |2:   29    |3:    6    |4:    1    |total:   261
 MOPB013.PDF  |1:    1    |2:    2    |3:  127    |4:  106    |5:    1    |total:   237
 MOPB014.PDF  |1:   11    |2:    3    |3:    2    |4:    1    |total:    17
 MOPB015.PDF  |1:    1    |2:    1    |3:    4    |4:    6    |total:    12
 MOPB016.PDF  |1:   25    |2:    4    |3:    2    |4:    1    |total:    32
 MOPB017.PDF  |1:    2    |2:    6    |3:    5    |4:    4    |5:    2    |total:    19
 MOPB018.PDF  |1:  120    |2:  172    |3:   83    |4:  101    |5:   52    |total:   528
 MOPB021.PDF  |1:   99    |2:    1    |3:    1    |4:    1    |5:    3    |total:   105
 MOPB022.PDF  |1:  138    |2:    2    |3:   28    |4:   65    |total:   233
 MOPB023.PDF  |1:    2    |2:   15    |3:    1    |total:    18
 MOPB025.PDF  |1:   91    |2:  115    |3:    1    |total:   207
 MOPB026.PDF  |1:    1    |2:    1    |3:    3    |total:     5
 MOPB030.PDF  |1:    6    |2:    4    |3:    1    |total:    11
 MOPB031.PDF  |1:    2    |2:   11    |3:    5    |total:    18
 MOPB032.PDF  |1:  108    |2:  196    |3:   77    |4:    1    |total:   382
 MOPB034.PDF  |1:  161    |2:   51    |3:    2    |4:   42    |5:   98    |total:   354
 MOPB035.PDF  |1:  137    |2:    9    |3:   16    |4:   11    |5:    5    |total:   178
 MOPB036.PDF  |1:    6    |2:   59    |3:    3    |total:    68
 MOPB037.PDF  |1:    6    |2:    6    |3:    4    |4:    5    |5:   63    |total:    84
 MOPB038.PDF  |1:    3    |2:   68    |3:  106    |4:   56    |5:   68    |total:   301
 MOPB040.PDF  |1:  108    |2:   10    |3:   54    |total:   172
 MOPB041.PDF  |1:   87    |2:   15    |3:    9    |4:    8    |5:    1    |total:   120
 MOPB042.PDF  |1:  114    |2:  123    |3:   84    |4:   20    |total:   341
 MOPB043.PDF  |1:    3    |2:    4    |3:    6    |4:    3    |5:    1    |total:    17
 MOPB045.PDF  |1:    1    |2:  112    |3:   57    |4:  139    |total:   309
 MOPB046.PDF  |1:  201    |2:  114    |3:  109    |4:   22    |total:   446
 MOPB048.PDF  |1:   86    |2:   84    |3:  104    |4:  422    |5:    5    |total:   701
 MOPB049.PDF  |1:    2    |2:    2    |3:  101    |4:   78    |total:   183
 MOPB050.PDF  |1:    1    |2:   24    |3:   24    |4:   12    |5:    1    |total:    62
 MOPB051.PDF  |1:  123    |2:    1    |3:    1    |4:   91    |5:   54    |total:   270
 MOPB053.PDF  |1:   98    |2:    6    |3:    6    |4:    4    |total:   114
 MOPB055.PDF  |1:  164    |2:  126    |3:  115    |4:  126    |5:  123    |total:   654
 MOPB056.PDF  |1:    2    |2:    2    |3:    1    |total:     5
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 MOPB068.PDF  |1:  132    |2:  108    |3:  113    |4:  127    |5:    1    |total:   481
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- A new script (earlier this year) that finds "tearing pages"
  - PDF bounding box problems
  - These papers need to be reprocessed
- Look for lines with '##'
- In IBIC15, this indicated that paper WEBLA02 had a problem
  - Can be fooled by pages with lots of math, large very detailed PS figures

JPSP Examples: WEBLA02 Tearing Boxes

DEVELOPMENT OF THE BEAM LOSS MONITOR FOR BEAM HALO MEASUREMENT IN THE J-PARC RCS

M. Yoshimoto#, H. Harada, K. Okabe, M. Kinsho,
J-PARC, JAEA, Tokai, Ibaraki, 319-1195, Japan

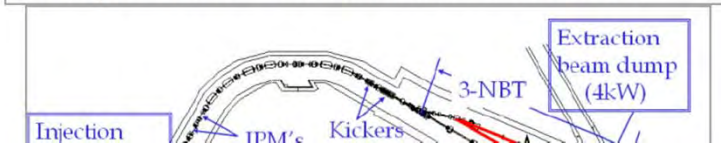
Abstract

In the J-PARC RCS, transverse beam profiles including both the beam core and halo at extraction beam transport line (3NBT) were measured by using a combination with a wire scanner type beam scraper and some beam loss monitors (BLMs). Our final goal of this halo monitor is to measure the intra-bunch beam halo of extracted two bunches from the RCS. Thus the plastic scintillator and photomultiplier (PMT) assemblages were adopted as the BLMs with quick time response. However, we found that the BLMs detected not only the radiation from the wire but also reflected one from other devices and wall. Therefore we tried to develop new-type BLMs, which are scintillation-type BLM of lead glass and Cherenkov-type BLM of quartz or UV acrylic. In this presentation, we will report on the overview and experimental results of the new-type BLMs together with the outline of halo monitor system.

INTRODUCTION

RCS. Thus a new beam halo monitor was developed and installed at the 3GeV-RCS to Neutron source Beam Transport (3NBT) line as shown in Fig. 1 and Fig. 2 [4]. This new beam halo monitor was constructed by combining a wire scanner type beam scraper and some beam loss monitors (BLMs). The transverse beam profile including the beam core and beam halo can be reconstructed with the halo monitor. On the other hand, our final goal of the halo monitor is to measure not only the transverse beam halo but also the intra-bunch beam halo of the extracted two bunches from the RCS. However the beam experiments made clear that there are some issues for the intra-bunch beam halo measurement.

In this paper, we report the transverse beam halo measurement with the new beam halo monitor. In addition, we introduce the new BLMs which were developed for intra-bunch beam halo measurement.



- Normal Acrobat/PitStop “edit text and images, select all” result: page 1

JPSP Examples: WEBLA02 Tearing Boxes

TRANSVERSE BEAM HALO MEASUREMENT

Measurement Principle

The new beam halo monitor was constructed by combining a wire scanner type beam scraper and some BLMs as shown in Fig. 3. Popular wire beam profile monitor detects the secondary electron emitted from the wire due to irradiate the beam. In this case, the wire signal should be disturbed by the floating electrons in the vacuum chamber. Moreover it is difficult to achieve a wide dynamic range for the beam halo measurement by using only the electric circuits. In contrast, our monitor detects the radiation in order to suppress the signal disturbance due to floating electrons. And more the ultra-wide dynamic range can be achieved by using the several BLMs with the different sensitivities.

type S-BLMs are a low sensitivity detectors to measure beam core elements.

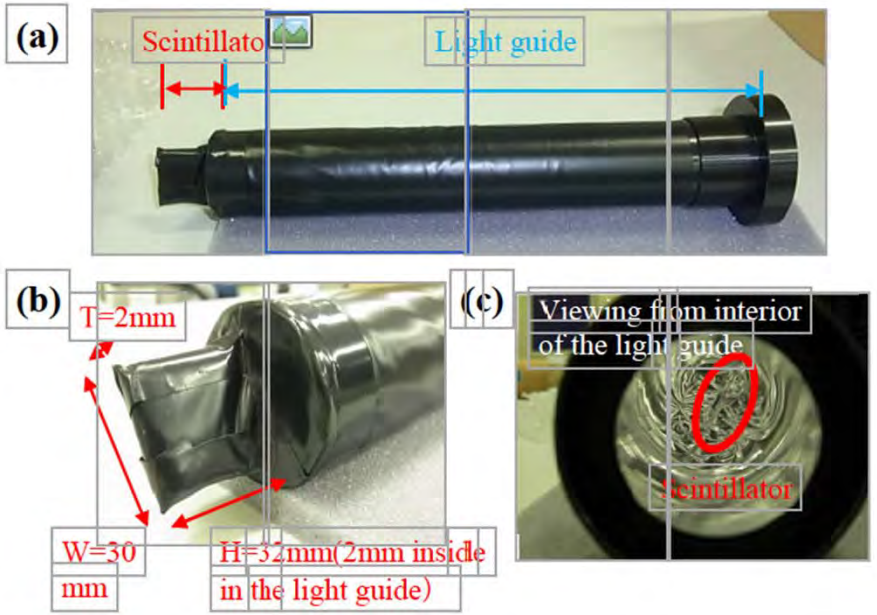


Figure 4: Photographs of the Small Scintillator type BLM. It has a light guide for a support of the thin plastic scintillator.

- Problem Acrobat/PitStop “edit text and images, select all” result: page 2

JPSP Example: IBIC'15 keywords

- Keywords are used as part of the indexing of the proceedings
- Less important with full-text search available from search engines
- List of regular expressions of keywords to search for is in JPSP distribution

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Keywords in IPAC'15

IPAC2015 - Proceedings Richmond, VA, USA

Keyword: accelerating-gradient

Paper	Title	Other Keywords	Page
MOPJE081	**Longitudinal Stability in Multi-Harmonic Accelerating Cavities**	cavity, acceleration, cathode, collider	506

- **R.M. Jones**, L.R. Carver
  UMAN, Manchester, United Kingdom
- J.L. Hirshfield
  Yale University, Physics Department, New Haven, CT, USA
- Y. Jiang
  Yale University, Beam Physics Laboratory, New Haven, Connecticut, USA

Accelerating cavities that excite multiple modes at integer harmonics of the fundamental frequency can potentially be used to limit the effects of rf breakdown and pulsed surface heating at high accelerating gradients. Understanding the longitudinal stability and the acceptance of such a cavity is important to their development and use. The general Hamiltonian for longitudinal stability in multi harmonic cavities is derived and the particle dynamics are explored.

JPSP Example: IBIC'15 proceedings

- Run a few more scripts to generate first-pass core of web proceedings
  - spmsbatch
    - Generates web pages, tex for watermarks
  - gen_texpdf.bat
    - Package raw files, create pdf with watermarks etc
  - spmsbatch
    - Ensure that all internal web links are generated

DEVELOPMENT OF A BEAM PULSE MONITOR FOR THE HEAVY ION ACCELERATOR FACILITY

D. Tsifakis#, N.R. Lobanov, P. Linardakis, ANU, Canberra, Australia

Abstract

The Australian National University (ANU) Heavy Ion Accelerator Facility (HIAF) comprises of a 15 million volt electrostatic accelerator (NEC 14UD) followed by a superconducting LINAC booster. The pulsing system consists of a low energy, single gap, gridded buncher and two high energy choppers. The buncher and choppers need to be set in phase and amplitude for maximum efficiency. The LINAC encompasses twelve, lead tin-plated Split Loop Resonators (SLR). Each SLR, as well as the superbuncher and time energy lens, needs to be individually tuned in phase and amplitude for correct operation. The HIAF pulsing system is based on a few techniques. The first one utilises a U-bend at the end of the LINAC. One special wide Beam Profile Monitor (BPM) is installed after the 90 degrees magnet. The technique allows to set up correct phase by observing the displacement of beam profile versus phase shift of the last phase locked resonator. The determination of beam pulse characteristics are based on γ-ray detection produced by beam striking a tantalum target. In this paper, the HIAF set up for pulsed beam diagnostics with sub nanosecond time resolution is described. The system has demonstrated simplicity of operation and high reliability.

INTRODUCTION

The ANU Heavy Ion Accelerator Facility consists of a National Electrostatics Corporation 14UD electrostatic tandem accelerator and a superconducting LINAC booster accelerator. The LINAC comprises of four cryostats, each consisting of three, split-ring resonators, operating at a frequency of approximately 150 MHz. When the beam needs to be accelerated in the LINAC or when the beam is required by the accelerator users to be bunched, the facility's buncher systems are utilised. The first buncher is installed at the low energy section of the 14UD accelerator. It is a gridded, room temperature, buncher using one or three frequencies to produce the field required for bunching. The resulting bunch has a typical width of 1.5 ns FWHM and the bunching efficiency is approximately 0.25.

A second buncher, Super Buncher (SB), is installed at the LINAC entrance. SB is a superconducting, quarter-wave resonator with β=0.1, developed at the ANU and can further compress the beam to bunches with, typically, 100 ps FWHM.

All bunchers as well as the LINAC, are synchronised to the facility's master 150 MHz clock. The low energy buncher operates on the sub-harmonic frequency of approximately 9.375 MHz (1/16 of the master clock) and the two high energy choppers on 37.5 MHz and 4.6875 MHz (1/4 and 1/32 of the master clock).

When the buncher systems are in use, it is important to have a monitoring system which allows the accelerator operator to measure the characteristics of the bunch in the time domain, to assist with the tuning. This paper describes the system used by the facility to produce a time profile of the pulsed beam. This technique of measuring the longitudinal profile is used by other facilities such as [1]. The output of the pulse monitor is used together with other measurement and tuning techniques [2, 3] to optimise the LINAC beam.

The development of this system has happened through the years and with the scientific contribution of the researchers of the Department of Nuclear Physics.

METHOD DESCRIPTION

The beam pulse monitoring system, shown in Fig. 1 is based on the time difference between prompt γ-rays produced by the beam striking a tantalum target and the reference RF used to synchronise the rest of the accelerator.

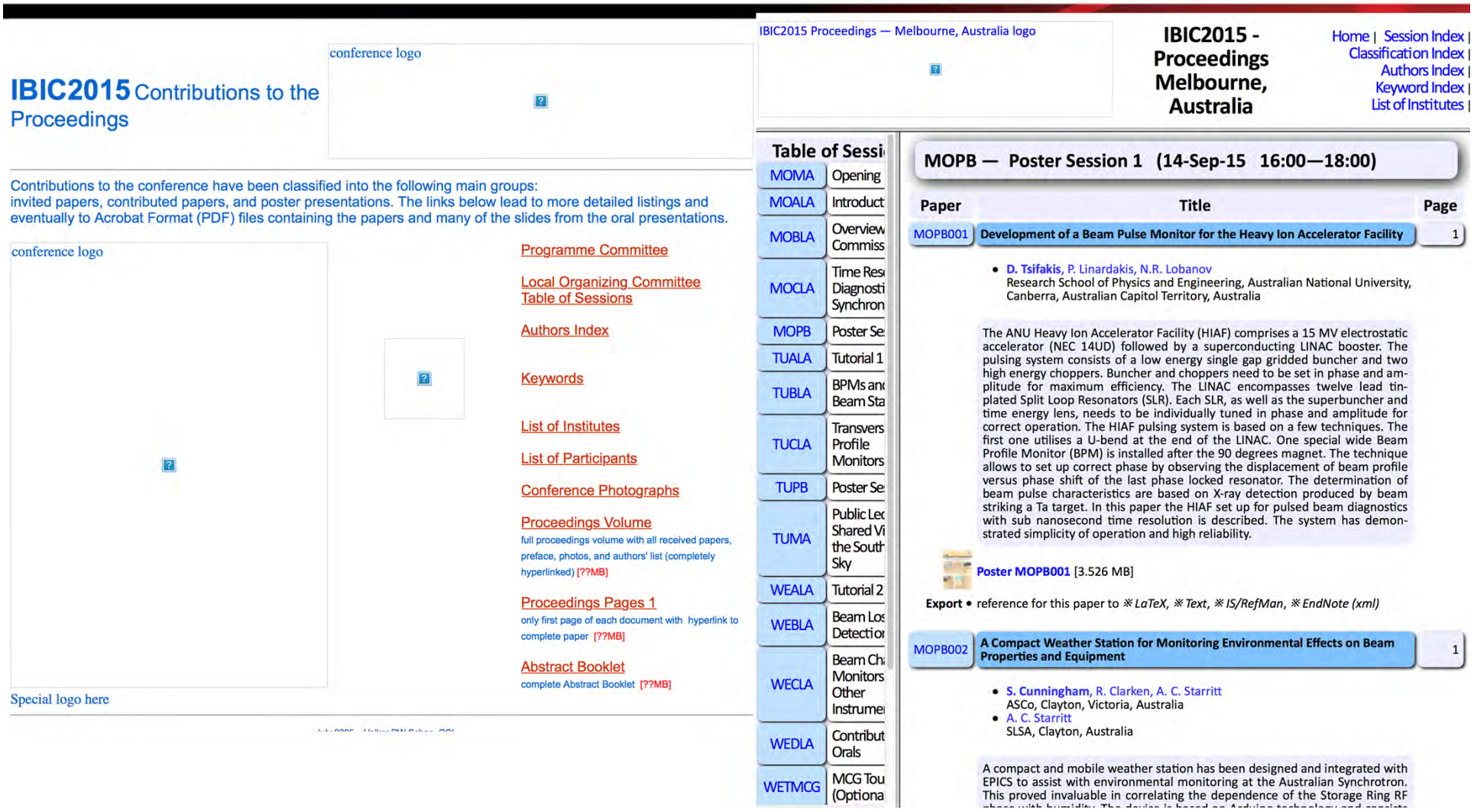
Figure 1: The target station of the beam pulse profile monitor. The target, as seen through the viewing port, can be moved in/out and is rotated by 45 degrees with respect to the beam.

The target is mounted at a 45 degree angle to the beam and it is placed in the path of the beam. This results in prompt γ-rays being produced, which are detected by a barium fluoride (BaF2) scintillation detector. The detector used at the ANU is made by Scionix Holland BV and is model number 38/25B30/2M BaFX2Neg. The BaF_2 detector signal provides the start signal to a time-to-analog converter (TAC) made by Ortec, model 567. The TAC is set to a maximum range of 100 ns. The amplitude signal from the detector is variable as the energy

#Dimitrios.Tsifakis@anu.edu.au

ISBN 978-3-95450-176-2

Indexloc.html: IBIC'15 proceedings skeleton!



IBIC2015 Contributions to the Proceedings

conference logo

Contributions to the conference have been classified into the following main groups:
invited papers, contributed papers, and poster presentations. The links below lead to more detailed listings and eventually to Acrobat Format (PDF) files containing the papers and many of the slides from the oral presentations.

conference logo

Special logo here

Programme Committee

Local Organizing Committee
Table of Sessions

Authors Index

Keywords

List of Institutes

List of Participants

Conference Photographs

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full proceedings volume with all received papers, preface, photos, and authors' list (completely hyperlinked) [??MB]

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Abstract Booklet
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Table of Sessi

MOMA	Opening
MOALA	Introduct
MOBLA	Overview Commiss
MOCLA	Time Res Diagnosti Synchron
MOPB	Poster Se
TUALA	Tutorial 1
TUBLA	BPMs an Beam Sta
TUCLA	Transvers Profile Monitors
TUPB	Poster Se
TUMA	Public Lec Shared Vi the South Sky
WEALA	Tutorial 2
WEBLA	Beam Los Detectio
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MOPB — Poster Session 1 (14-Sep-15 16:00—18:00)

Paper	Title	Page
MOPB001	**Development of a Beam Pulse Monitor for the Heavy Ion Accelerator Facility**	1

- **D. Tsifakis**, P. Linardakis, N.R. Lobanov
  Research School of Physics and Engineering, Australian National University, Canberra, Australian Capitol Territory, Australia

The ANU Heavy Ion Accelerator Facility (HIAF) comprises a 15 MV electrostatic accelerator (NEC 14UD) followed by a superconducting LINAC booster. The pulsing system consists of a low energy single gap gridded buncher and two high energy choppers. Buncher and choppers need to be set in phase and amplitude for maximum efficiency. The LINAC encompasses twelve lead tin-plated Split Loop Resonators (SLR). Each SLR, as well as the superbuncher and time energy lens, needs to be individually tuned in phase and amplitude for correct operation. The HIAF pulsing system is based on a few techniques. The first one utilises a U-bend at the end of the LINAC. One special wide Beam Profile Monitor (BPM) is installed after the 90 degrees magnet. The technique allows to set up correct phase by observing the displacement of beam profile versus phase shift of the last phase locked resonator. The determination of beam pulse characteristics are based on X-ray detection produced by beam striking a Ta target. In this paper the HIAF set up for pulsed beam diagnostics with sub nanosecond time resolution is described. The system has demonstrated simplicity of operation and high reliability.

Poster MOPB001 [3.526 MB]

Export • reference for this paper to ※ *LaTeX*, ※ *Text*, ※ *IS/RefMan*, ※ *EndNote (xml)*

MOPB002	**A Compact Weather Station for Monitoring Environmental Effects on Beam Properties and Equipment**	1

- **S. Cunningham**, R. Clarken, A. C. Starritt
  ASCo, Clayton, Victoria, Australia
- A. C. Starritt
  SLSA, Clayton, Australia

A compact and mobile weather station has been designed and integrated with EPICS to assist with environmental monitoring at the Australian Synchrotron. This proved invaluable in correlating the dependence of the Storage Ring RF

And now slides from Volker's WECA2 Valencia Team Meeting presentation on program booklets…

*Files

spmsbatch generates TeX files with all information about

* sessions, papers, etc.
* author list
* institute list

These files are using macros

```
\NewDay{17}{September}{12}{Monday}

\SessionHeader{posses}{17-Sep-12}{09:10}{10:20}{Oral}{Ballroom}
\SessionBody{posses}{MOI1A}{Invited Plenary - Session A}{Oral}{J.Q.~Wang (IHEP)}

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           {LHC - Challenges in Handling Beams Exceeding 100 MJ}%
           {\bold{R.~Schmidt}  (CERN) }%
           {The Large Hadron Collider (LHC) at CERN operates at 4 TeV with high i
           The energy stored in each beams is beyond 130 MJ, less than a factor o
           a regime where various effects due to high intensity bunches are obser
           collimation system limits beam losses that threaten to quench supercon
           during the different operational phases, where already a small fractio
           case of uncontrolled beam loss. Safe operation in presence of such hig
           dumping system, beam interlocks, beam instrumentation, equipment monit
           machine protection and collimation will be discussed.}
```

*Macros

There are macros for

* a day
* header and footer
* table of contents
* **sessions**
* **papers**
* **author index**
* **etc.**

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\NewDay
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\ThumbIndex
\tocpage
\SessionHeader
\SessionBody
\Paper
\PaperAbs
\PaperList
\AuthorIndex
```
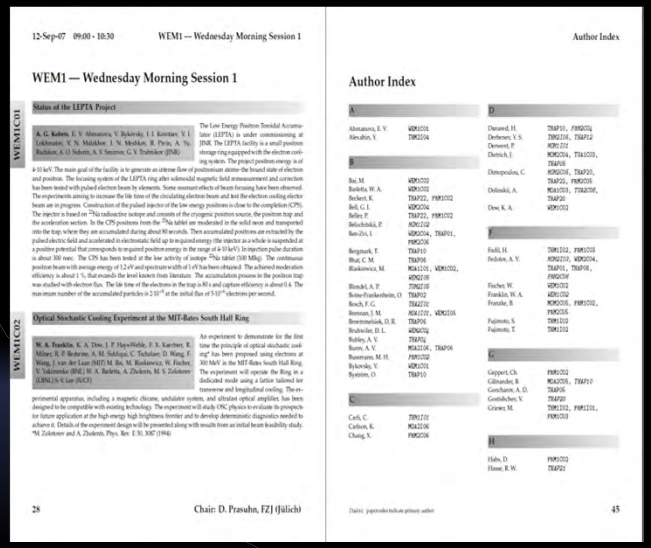
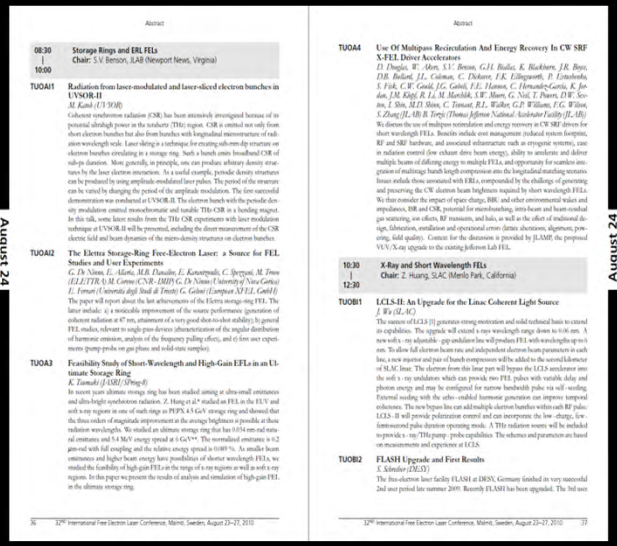

*Templates

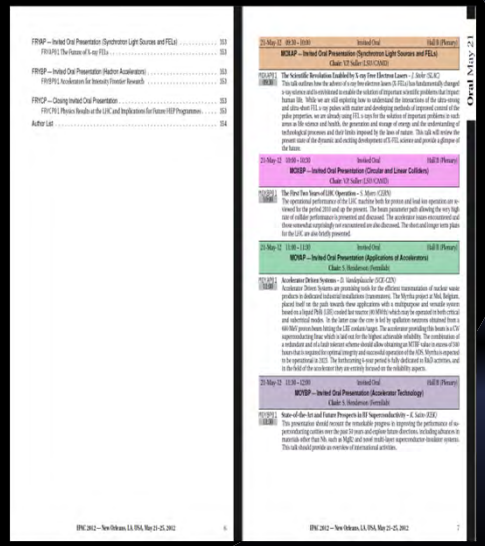
There are different base templates for producing

* a ‘Program Booklet’
* an ‘Abstract Volume’
* a ‘Proceedings Volume’ (for print)

As all conferences have special wishes, so each template has been modified to accomplish them.







*Templates...

Template modifications for all of these values are possible

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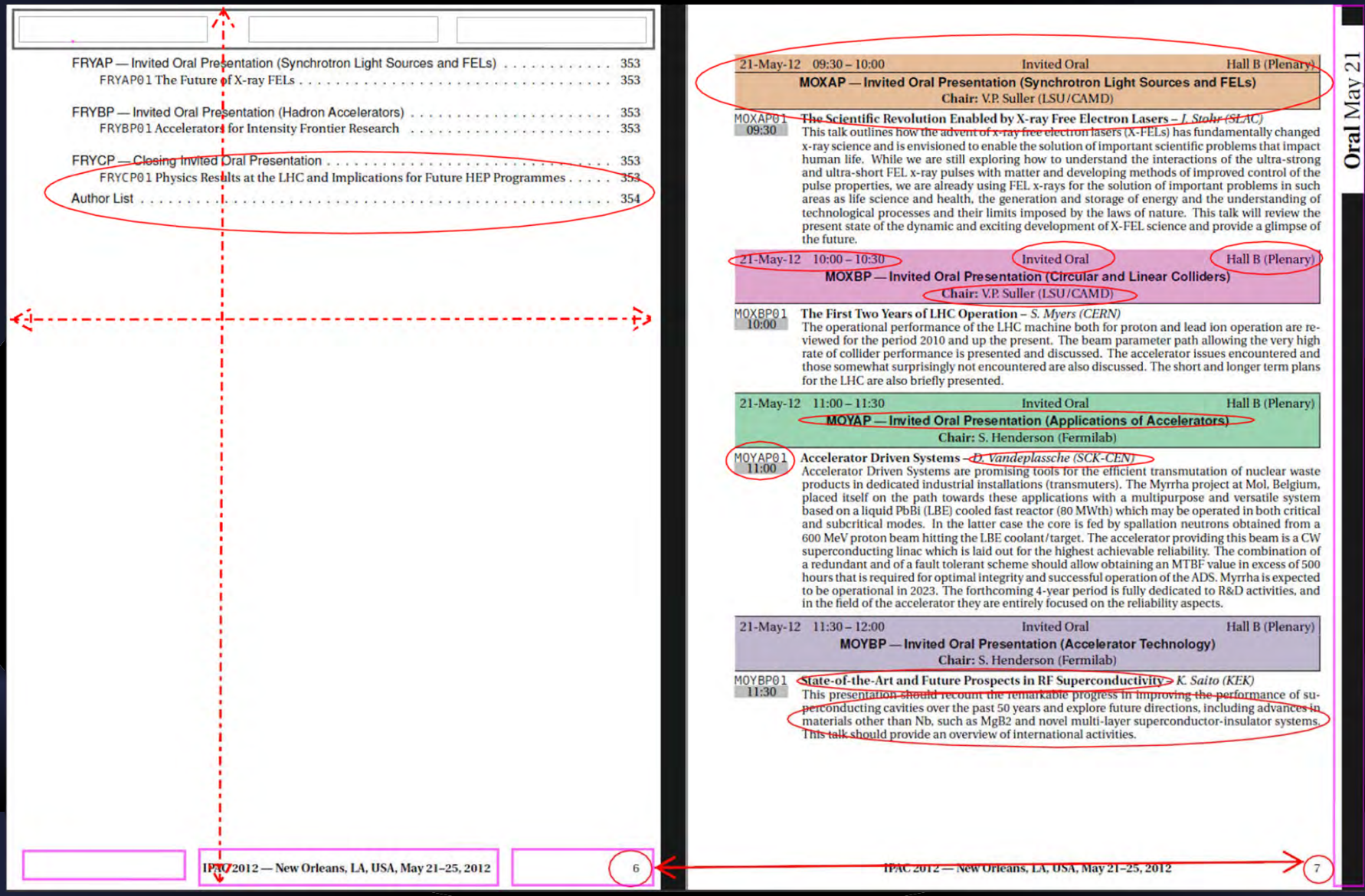
* one sided/two sided
* header/footer content/placement
* color (synoptic table) or b/w
* formatting of session header/body/chair
* formatting of paper title/authors/abstract text
* margins for binding (glue or spiral)
* thumb index (placement/color/content)
* table of contents formatting
* ...

Template modifications

*Templates...



21-May-12 09:30 – 10:00 Invited Oral Hall B (Plenary)

MOXAP — Invited Oral Presentation (Synchrotron Light Sources and FELs)

Chair: V.P. Suller (LSU/CAMD)

MOXAP01 09:30 **The Scientific Revolution Enabled by X-ray Free Electron Lasers** – *J. Stohr (SLAC)*
This talk outlines how the advent of x-ray free electron lasers (X-FELs) has fundamentally changed x-ray science and is envisioned to enable the solution of important scientific problems that impact human life. While we are still exploring how to understand the interactions of the ultra-strong and ultra-short FEL x-ray pulses with matter and developing methods of improved control of the pulse properties, we are already using FEL x-rays for the solution of important problems in such areas as life science and health, the generation and storage of energy and the understanding of technological processes and their limits imposed by the laws of nature. This talk will review the present state of the dynamic and exciting development of X-FEL science and provide a glimpse of the future.

21-May-12 10:00 – 10:30 Invited Oral Hall B (Plenary)

MOXBP — Invited Oral Presentation (Circular and Linear Colliders)

Chair: V.P. Suller (LSU/CAMD)

MOXBP01 10:00 **The First Two Years of LHC Operation** – *S. Myers (CERN)*
The operational performance of the LHC machine both for proton and lead ion operation are reviewed for the period 2010 and up the present. The beam parameter path allowing the very high rate of collider performance is presented and discussed. The accelerator issues encountered and those somewhat surprisingly not encountered are also discussed. The short and longer term plans for the LHC are also briefly presented.

21-May-12 11:00 – 11:30 Invited Oral Hall B (Plenary)

MOYAP — Invited Oral Presentation (Applications of Accelerators)

Chair: S. Henderson (Fermilab)

MOYAP01 11:00 **Accelerator Driven Systems** – *D. Vandeplassche (SCK-CEN)*
Accelerator Driven Systems are promising tools for the efficient transmutation of nuclear waste products in dedicated industrial installations (transmuters). The Myrrha project at Mol, Belgium, placed itself on the path towards these applications with a multipurpose and versatile system based on a liquid PbBi (LBE) cooled fast reactor (80 MWth) which may be operated in both critical and subcritical modes. In the latter case the core is fed by spallation neutrons obtained from a 600 MeV proton beam hitting the LBE coolant/target. The accelerator providing this beam is a CW superconducting linac which is laid out for the highest achievable reliability. The combination of a redundant and of a fault tolerant scheme should allow obtaining an MTBF value in excess of 500 hours that is required for optimal integrity and successful operation of the ADS. Myrrha is expected to be operational in 2023. The forthcoming 4-year period is fully dedicated to R&D activities, and in the field of the accelerator they are entirely focused on the reliability aspects.

21-May-12 11:30 – 12:00 Invited Oral Hall B (Plenary)

MOYBP — Invited Oral Presentation (Accelerator Technology)

Chair: S. Henderson (Fermilab)

MOYBP01 11:30 **State-of-the-Art and Future Prospects in RF Superconductivity** – *K. Saito (KEK)*
This presentation should recount the remarkable progress in improving the performance of superconducting cavities over the past 50 years and explore future directions, including advances in materials other than Nb, such as MgB2 and novel multi-layer superconductor-insulator systems. This talk should provide an overview of international activities.

*Templates…

All modifications are possible

* if you know a bit about LaTeX
* if you know somebody who knows …
* if you like to try

Now some examples of what has been done…

*Examples (ConTeXt)

MOP09

Status of the 7 MeV/u, 217 MHz Injector Linac for the Heidelberg Cancer Therapy Facility

B. Schlitt, G. Hutter, F. Klos, C. Muehle, W. Vinzenz (GSI, Darmstadt) A. Bechtold, U. Ratzinger, A. Schempp (IAP, Frankfurt-am-Main) Y.R. Lu (PKU/IHIP, Beijing)

A clinical synchrotron facility for cancer therapy using energetic proton and ion beams (C, He and O) is under construction and will be installed at the Radiologische Universitätsklinik in Heidelberg, Germany, starting in 2005. The status of the ECR ion source systems, the beam line components of the low energy beam transport lines, the 400 keV/u RFQ and the 20 MV IH-cavity as well as the linac rf system will be reported. Two prototype magnets of the linac quadrupole magnets have been built at GSI and have been tested successfully. A test bench for the 1.4 MW, 217 MHz cavity amplifier built by industry has been installed at GSI including a 120 kW driver amplifier which will be used also for high power tests of the RFQ. A test bench for the RFQ using proton beams is presently being set up at the IAP. RF tuning of the 1:2 scaled IH-DTL model as well as Microwave Studio simulations of the model and the power cavity have been also performed at the IAP [1].

[1] Y.Lu, S.Minaev, U.Ratzinger, B.Schlitt, R.Tiede, this conference.

MOP10

The IH Cavity for HITRAP

C. A. Kitegi, U. Ratzinger (IAP, Frankfurt-am-Main) S. Minaev (ITEP, Moscow)

RFQs are already used to decelerate ions beams at low energy. Within the HITRAP facility at GSI a combination of an IH drift tube cavity operating at the H11(0) mode and a 4-rod RFQ is proposed to decelerate the 0.001 ms heavy ions bunches (up to U^{92+}) from 4 A×MeV to 6 keV×A. The operating frequency is 108.408 MHz. The A/q range of the linac is up to 3. A 4 gaps quarter wave resonator will match the 0.001 ms bunches from the ESR into the IH cavity. By applying the KONUS dynamics, the 2.7 meters long IH cavity will perform a high efficiency deceleration by up 11 MV with 200 kW rf power. The beam dynamics performed with the LORASR simulation code will be shown. The transmission limited by the buncher is nearly 30%. An alternative 2nd harmonic bunching section, which allows higher transmission and/or smallest longitudinal emittance, will be discussed. It is aimed to reach an effective shunt impedance around 260 MW/m for the IH cavity. The cavity geometrical parameters estimations and Microwave Studio simulations will be presented.

MOP11

RF Model Measurements and Numerical Simulations for the 20 MV IH-DTL Cavity of the Heidelberg Cancer Therapy Facility

Y.R. Lu, Y.R. Lu, B. Schlitt (GSI, Darmstadt) S. Minaev (ITEP, Moscow) U. Ratzinger, R. Tiede (IAP, Frankfurt-am-Main)

A clinical synchrotron facility for cancer therapy using energetic proton and ion beams (C, He and O) is under construction and will be installed at the Radiologische Universitätsklinik in Heidelberg, Germany, starting in 2005. The different rf tuning concepts and tuning results

for an 1:2 scaled IH-DTL model cavity are presented. Microwave Studio simulations have been carried out for the model and for the real power cavity. Results from the model measurements and the field simulations agree very well also for the higher order modes. The beam matching from the RFQ to the IH-DTL was optimised. Beam dynamics simulations using the LORASR code and starting with a particle distribution at the RFQ exit as calculated with PARMTEQ are presented. The IH drift tube array was matched with the gap voltage distribution resulting from rf model measurements.

MOP12

KONUS Beam Dynamics Design of a 70 mA, 70 MeV Proton CH-DTL for GSI-SIS12

R. Tiede, G. Clemente, H. Podlech, U. Ratzinger (IAP, Frankfurt-am-Main) W. Barth, L. Groening (GSI, Darmstadt) Z. Li (IMP, Lanzhou) S. Minaev (ITEP, Moscow)

The future scientific program at GSI needs a dedicated proton injector into the synchrotron SIS, in order to increase the proton intensity of the existing UNILAC/SIS12 combination by a factor of 70, resulting in 7· 10^{12} protons in the synchrotron. A compact and efficient 352 MHz RFQ - CH-DTL combination based on novel structure developments for RFQ and DTL was worked out. For DTLs operated in an H-mode like CH-cavities (H210-mode), the shunt impedance is optimized by use of the KONUS beam dynamics. Beam dynamics simulation results of the CH-DTL section, covering the energy range from 3 to 70 MeV, with emphasis on the low energy front end are presented. Optimization aims are the reduction of emittance growth, of beam losses and of capital costs, by making use of the high acceleration gradients and shunt impedance values provided by the Crossbar H-Type (CH) structure. In addition, the beam dynamics design of the overall DTL layout has to be matched to the power limits of the available 352 MHz power klystrons. The aim is to power each cavity by one klystron with a peak rf power of around 1 MW.

MOP13

Status of A Tuner Development for A 352 MHz Superconducting CH-Cavity

A.C. Sauer, H. Deitinghoff, H. Klein, H. Liebermann, H. Podlech, U. Ratzinger, R. Tiede (IAP, Frankfurt-am-Main)

H-Mode cavities have been developed successfully during the last decades for a large variety of applications in the field of ion acceleration. The CH-structure is a new H-mode drift tube structure operating in the TE210 mode which is currently under development at the IAP Frankfurt. In this paper we present the status of a tuner development of a superconducting 352 MHz CH cavity prototype which will be delivered and ready for the first cold tests in a vertical cryostat in the middle of this year. Cavity simulations of

a. the static tuning sensitivities with some additional niobium blocks inside the cavity, for a rough tuning during fabrication and
b. mechanic tuning sensitivities where the resonator end-walls will be stretched and squeezed, for tuning during cold operation with MicroWave Studio will be presented.

Moreover simulations of the transverse and longitudinal mechanic eigenmodes (microphonics) and stress capabilities of the thin-walled resonators with ANSYS will be outlined to calculate the tuning range of a bulk niobium CH-cavity. Finally the results will be discussed.

*Examples (ConTeXt)

WEM1 — Wednesday Morning Session 1

WEM1C01

Status of the LEPTA Project

A. G. Kobets, E. V. Ahmanova, V. Bykovsky, I. I. Korotaev, V. I. Lokhmatov, V. N. Malakhov, I. N. Meshkov, R. Pivin, A. Yu. Rudakov, A. O. Sidorin, A. V. Smirnov, G. V. Trubnikov (JINR)

The Low Energy Positron Toroidal Accumulator (LEPTA) is under commissioning at JINR. The LEPTA facility is a small positron storage ring equipped with the electron cooling system. The project positron energy is of 4-10 keV. The main goal of the facility is to generate an intense flow of positronium atoms–the bound state of electron and positron. The focusing system of the LEPTA ring after solenoidal magnetic field remeasurement and correction has been tested with pulsed electron beam by elements. Some resonant effects of beam focusing have been observed. The experiments aiming to increase the life time of the circulating electron beam and test the electron cooling elector beam are in progress. Construction of the pulsed injector of the low energy positrons is close to the completion (CPS). The injector is based on ^{22}Na radioactive isotope and consists of the cryogenic positron source, the positron trap and the acceleration section. In the CPS positrons from the ^{22}Na tablet are moderated in the solid neon and transported into the trap, where they are accumulated during about 80 seconds. Then accumulated positrons are extracted by the pulsed electric field and accelerated in electrostatic field up to required energy (the injector as a whole is suspended at a positive potential that corresponds to required positron energy in the range of 4-10 keV). In injection pulse duration is about 300 nsec. The CPS has been tested at the low activity of isotope ^{22}Na tablet (100 MBq). The continuous positron beam with average energy of 1.2 eV and spectrum width of 1 eV has been obtained. The achieved moderation efficiency is about 1 %, that exceeds the level known from literature. The accumulation process in the positron trap was studied with electron flux. The life time of the electrons in the trap is 80 s and capture efficiency is about 0.4. The maximum number of the accumulated particles is $2{\cdot}10^{+8}$ at the initial flux of $5{\cdot}10^{+6}$ electrons per second.

WEM1C02

Optical Stochastic Cooling Experiment at the MIT-Bates South Hall Ring

W. A. Franklin, K. A. Dow, J. P. Hays-Wehle, F. X. Kaertner, R. Milner, R. P. Redwine, A. M. Siddiqui, C. Tschalaer, D. Wang, F. Wang, J. van der Laan (MIT) M. Bai, M. Blaskiewicz, W. Fischer, V. Yakimenko (BNL) W. A. Barletta, A. Zholents, M. S. Zolotorev (LBNL) S.-Y. Lee (IUCF)

An experiment to demonstrate for the first time the principle of optical stochastic cooling* has been proposed using electrons at 300 MeV in the MIT-Bates South Hall Ring. The experiment will operate the Ring in a dedicated mode using a lattice tailored for transverse and longitudinal cooling. The experimental apparatus, including a magnetic chicane, undulator system, and ultrafast optical amplifier, has been designed to be compatible with existing technology. The experiment will study OSC physics to evaluate its prospects for future application at the high energy high brightness frontier and to develop deterministic diagnostics needed to achieve it. Details of the experiment design will be presented along with results from an initial beam feasibility study.
*M. Zolotorev and A. Zholents, Phys. Rev. E 50, 3087 (1994)

Author Index

Italic papercodes indicate primary author

*Examples (ConTeXt)

ITMM — Monday Morning Invited Talk

Instrumentation in Small Low Energy Machines

ITMM01

U. Raich (CERN)

Low energy particle accelerators are used either as injector for higher energy machines or as dedicated machines for special purposes. These may by industrial, medical or prototype machines for testing new accelerating schemes. Low energy beams open measurement possibilities not available at higher energies due to the low magnetic rigidity of the particles and due their small penetration depth. On the other hand these beams also represent special challenges due to their high energy deposition in matter, space charge problems etc. which are not seen at higher energies. Measurement principles typical for small accelerators will be presented and explained with the help of example implementations.

Commissioning of SNS Beam Instrumentation*

ITMM02

T.J. Shea (ORNL)

The Spallation Neutron Source (SNS) is an accelerator-based neutron facility under construction in Oak Ridge, Tennessee. The project is a collaboration of 6 partner laboratories: Lawrence Berkeley (LBNL), Los Alamos (LANL), Argonne (ANL), Brookhaven (BNL), Jefferson (Jlab), and Oak Ridge (ORNL). To achieve the performance goals, the SNS accelerator facility must deliver over one megawatt of beam power to a mercury target. This talk will describe the beam diagnostic instrumentation required to commission and operate such a facility at high beam power. Status of the SNS construction and recent beam commissioning results will also be presented.

Beam Halo Observation by Coronagraph

ITMM03

T. Mitsuhashi (KEK)

We developed a coronagraph to observe the image of the beam halo, or tail, surrounding the beam. The concept of the coronagraph was invented by B.F. Lyott for the observation of sun coronas. In the coronagraph, an opaque disk is placed in the image plane of an objective lens to block the glare of the sun image. The diffracted light is eliminated by re-diffraction optics with a Lyott stop. We used this coronagraph to observe the beam halo. A great advantage in using the coronagraph is that we can observe the two-dimensional spatial distribution of the beam halo via its image. The re-diffraction optics of the coronagraph is optimized for the observation of beam halo. The optical polishing of the objective lens is one of most critical points in the observation a weak halo or tail. With a very well-polished lens, we succeeded in obtaining a background-to-peak intensity ratio better than 10^{-6}. As a demonstration, we observed the beam tail at the Photon Factory storage ring. We succeeded in observing an image of the non-Gaussian tail surrounding the beam, with an intensity range down to 1/104 of the peak intensity.

*Examples (Designer work - FEL2010)

August 24

08:30 | 10:00 — **Storage Rings and ERL FELs**
Chair: S.V. Benson, JLAB (Newport News, Virginia)

TUOAI1 **Radiation from laser-modulated and laser-sliced electron bunches in UVSOR-II**
M. Katoh (UVSOR)

Coherent synchrotron radiation (CSR) has been intensively investigated because of its potential ultrahigh power in the terahertz (THz) region. CSR is emitted not only from short electron bunches but also from bunches with longitudinal microstructure of radiation wavelength scale. Laser slicing is a technique for creating sub-mm dip structure on electron bunches circulating in a storage ring. Such a bunch emits broadband CSR of sub-ps duration. More generally, in principle, one can produce arbitrary density structures by the laser electron interaction. As a useful example, periodic density structures can be produced by using amplitude-modulated laser pulses. The period of the structure can be varied by changing the period of the amplitude modulation. The first successful demonstration was conducted at UVSOR-II. The electron bunch with the periodic density modulation emitted monochromatic and tunable THz-CSR in a bending magnet. In this talk, some latest results from the THz CSR experiments with laser modulation technique at UVSOR-II will be presented, including the direct measurement of the CSR electric field and beam dynamics of the micro-density structures on electron bunches.

TUOAI2 **The Elettra Storage-Ring Free-Electron Laser: a Source for FEL Studies and User Experiments**
G. De Ninno, E. Allaria, M.B. Danailov, E. Karantzoulis, C. Spezzani, M. Trovo (ELETTRA) M. Coreno (CNR - IMIP) G. De Ninno (University of Nova Gorica) E. Ferrari (Università degli Studi di Trieste) G. Geloni (European XFEL GmbH)

The paper will report about the last achievements of the Elettra storage-ring FEL. The latter include: a) a noticeable improvement of the source performance (generation of coherent radiation at 87 nm, attainment of a very good shot-to-shot stability); b) general FEL studies, relevant to single-pass devices (characterization of the angular distribution of harmonic emission, analysis of the frequency pulling effect), and c) first user experiments (pump-probe on gas phase and solid-state samples).

TUOA3 **Feasibility Study of Short-Wavelength and High-Gain EFLs in an Ultimate Storage Ring**
K. Tsumaki (JASRI/SPring-8)

In recent years ultimate storage ring has been studied aiming at ultra-small emittances and ultra-bright synchrotron radiation. Z. Hung et al.* studied an FEL in the EUV and soft x-ray regions in one of such rings as PEPX 4.5 GeV storage ring and showed that the three orders of magnitude improvement in the average brightness is possible at these radiation wavelengths. We studied an ultimate storage ring that has 0.034 nm-rad natural emittance and 5.4 MeV energy spread at 6 GeV**. The normalized emittance is 0.2 μm-rad with full coupling and the relative energy spread is 0.089 %. As smaller beam emittances and higher beam energy have possibilities of shorter wavelength FELs, we studied the feasibility of high-gain FELs in the range of x-ray regions as well as soft x-ray regions. In this paper we present the results of analysis and simulation of high-gain FEL in the ultimate storage ring.

TUOA4 **Use Of Multipass Recirculation And Energy Recovery In CW SRF X-FEL Driver Accelerators**
D. Douglas, W. Akers, S.V. Benson, G.H. Biallas, K. Blackburn, J.R. Boyce, D.B. Bullard, J.L. Coleman, C. Dickover, F.K. Ellingsworth, P. Evtushenko, S. Fisk, C.W. Gould, J.G. Gubeli, F.E. Hannon, C. Hernandez-Garcia, K. Jordan, J.M. Klopf, R. Li, M. Marchlik, S.W. Moore, G. Neil, T. Powers, D.W. Sexton, I. Shin, M.D. Shinn, C. Tennant, R.L. Walker, G.P. Williams, F.G. Wilson, S. Zhang (JLAB) B. Terzic (Thomas Jefferson National Accelerator Facility (JLAB))

We discuss the use of multipass recirculation and energy recovery in CW SRF drivers for short wavelength FELs. Benefits include cost management (reduced system footprint, RF and SRF hardware, and associated infrastructure such as cryogenic systems), ease in radiation control (low exhaust drive beam energy), ability to accelerate and deliver multiple beams of differing energy to multiple FELs, and opportunity for seamless integration of multistage bunch length compression into the longitudinal matching scenario. Issues include those associated with ERLs, compounded by the challenge of generating and preserving the CW electron beam brightness required by short wavelength FELs. We thus consider the impact of space charge, BBU and other environmental wakes and impedances, ISR and CSR, potential for microbunching, intra-beam and beam-residual gas scattering, ion effects, RF transients, and halo, as well as the effect of traditional design, fabrication, installation and operational errors (lattice aberations, alignment, powering, field quality). Context for the discussion is provided by JLAMP, the proposed VUV/X-ray upgrade to the existing Jefferson Lab FEL.

August 24

10:30 | 12:30 — **X-Ray and Short Wavelength FELs**
Chair: Z. Huang, SLAC (Menlo Park, California)

TUOBI1 **LCLS-II: An Upgrade for the Linac Coherent Light Source**
J. Wu (SLAC)

The success of LCLS [1] generates strong motivation and solid technical basis to extend its capabilities. The upgrade will extend x-rays wavelength range down to 0.06 nm. A new soft x - ray adjustable - gap undulator line will produce FEL with wavelengths up to 6 nm. To allow full electron beam rate and independent electron beam parameters in each line, a new injector and pair of bunch compressors will be added to the second kilometer of SLAC linac. The electron from this linac part will bypass the LCLS accelerator into the soft x - ray undulators which can provide two FEL pulses with variable delay and photon energy and may be configured for narrow bandwidth pulse via self - seeding. External seeding with the echo - enabled harmonic generation can improve temporal coherence. The new bypass line can add multiple electron bunches within each RF pulse. LCLS - II will provide polarization control and can incorporate the low - charge, few - femtosecond pulse duration operating mode. A THz radiation source will be included to provide x - ray/THz pump - probe capabilities. The schemes and parameters are based on measurements and experience at LCLS.

TUOBI2 **FLASH Upgrade and First Results**
S. Schreiber (DESY)

The free-electron laser facility FLASH at DESY, Germany finished its very successful 2nd user period late summer 2009. Recently FLASH has been upgraded. The 3rd user

*Examples (Designer work - FEL2010)

*Examples (Designer work - FEL2010)

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*Examples (Abstract booklet HB2012)

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September 17

17-Sep-12 09:10 – 10:20 | Oral | Main Hall

MOI1A — Invited Plenary - Session A

Plenary

MOI1A01 09:10 **LHC - challenges in handling beams exceeding 100 MJ** – ***R. Schmidt*** *(CERN)*
The Large Hadron Collider (LHC) at CERN operates at 4 TeV with high intensity beams, with bunch intensities exceeding the nominal value by several 10 %. The energy stored in each beams is beyond 130 MJ, less than a factor of three from the nominal value at 7 TeV. With these parameters, operation entered into a regime where various effects due to high intensity bunches are observed (instabilities, beam-beam effects, e-cloud effects). The highly efficient collimation system limits beam losses that threaten to quench superconducting magnets. The correct functioning of the machine protection systems is vital during the different operational phases, where already a small fraction of the stored energy is sufficient to damage accelerator equipment or experiments in case of uncontrolled beam loss. Safe operation in presence of such high intensity proton beams is guaranteed by the interplay of many different systems: beam dumping system, beam interlocks, beam instrumentation, equipment monitoring, collimators and absorbers. The experience gained with the key systems of LHC machine protection and collimation will be discussed.

MOI1A02 09:45 **J-PARC Recovery Status** – ***K. Yamamoto*** *(JAEA/J-PARC)*
J-PARC facilities were seriously damaged by the Great East Japan Earthquake in March 2011, but all facilities resumed a beam operation from December 2012. We report the operation status of J-PARC accelerators after the earthquake.

*Examples (Abstract booklet HB2012)

Authors

*Examples (Program booklet HB2012)

Tuesday, 18-September-2012

18-Sep-12 | 10:50–12:30 | Ballroom

TUO1B — Working Group-A&C

Chair: H.W. Zhao (IMP)

TUO1B01 10:50 **Beam Loss Due to Foil Scattering in the SNS Accumulator Ring**
J.A. Holmes (ORNL), M.A. Plum (ORNL)

TUO1B02 11:10 **Injection Design for Fermilab Project X**
D.E. Johnson (Fermilab)

TUO1B03 11:30 **Study of Intense Beam Injection and Extraction of Heavy Ion Synchrotron**
Y.J. Yuan (IMP), W.P. Chai, J. Li, P. Li, R.S. Mao, J.W. Xia, J.C. Yang, X.D. Yang, H.W. Zhao (IMP)

TUO1B04 11:50 **Beam Loss Control for the Fermilab Main Injector**
B.C. Brown (Fermilab)

TUO1B05 12:10 **The Design and Commissioning of the Accelerator System of the Rare Isotope Reaccelerator - ReA3 at Michigan State University**
X. Wu (FRIB), B. Durickovic, M.J. Syphers, W. Wittmer (FRIB) A. Lapierre, D. Leitner, G. Perdikakis, J.A. Rodriguez, S. Schwarz (NSCL)

12:30–14:00 Lunch — *Restaurant »Solid Dining«*

18-Sep-12 | 10:50–12:30 | Meeting Room 3

TUO3B — Working Group-B

Chair: S. Fu (IHEP)

TUO3B01 10:50 **Beam Dynamics Design of ESS Warm Linac**
M. Comunian (INFN/LNL)

TUO3B02 11:10 **Beam Dynamics of the ESS Superconducting Linac**
M. Eshraqi (ESS)

TUO3B03 11:30 **Linac4 Beam Dynamics and Commissioning Strategy**
J.-B. Lallement (CERN), G. Bellodi, A.M. Lombardi, P.A. Posocco (CERN)

TUO3B04 11:50 **End to End Beam Dynamics and Design Optimization for CSNS Linac**
J. Peng (IHEP), S. Fu, H.C. Liu, X. Yin (IHEP)

TUO3B05 12:10 **Beam Dynamics of the 13 MeV/50 mA Proton Linac for the Compact Pulsed Hadron Source at Tsinghua University**
Q.Z. Xing (TUB), C. Jiang, C.-X. Tang, H.Y. Zhang, S.X. Zheng (TUB) X.L. Guan (Tsinghua University) G.H. Li (NUCTECH)

12:30–14:00 Lunch — *Restaurant »Solid Dining«*

Tuesday, 18-September-2012

18-Sep-12 | 14:00–16:30 | Ballroom

TUO1C — Working Group-E

Chair: R. Doelling (PSI) & N. Hayashi (J-PARC)

TUO1C01 14:00 **Recent Developments on High Intensity Beam Diagnostics at SNS.**
W. Blokland (ORNL)

TUO1C02 14:20 **Online Monitoring System for the Waste Beam in the 3 GeV RCS of J-PARC**
P.K. Saha (JAEA/J-PARC), H. Harada, S. Hatakeyama, N. Hayashi, H. Hotchi, K. Yamamoto, M. Yoshimoto (JAEA/J-PARC)

TUO1C03 14:40 **The Beam Diagnostics of CSNS**
T.G. Xu (IHEP)

15:00–15:30 Coffee

TUO1C04 15:30 **Detection of 'Unidentified Falling Objects' at LHC**
E. Nebot Del Busto (CERN), F.V. Day, B. Dehning, E.B. Holzer, A. Lechner, R. Schmidt, J. Wenninger, C. Zamantzas, M. Zerlauth, F. Zimmermann (CERN) T. Baer (University of Hamburg) M. Hempel (BTU)

TUO1C05 15:50 **Measurements and Interpretation of the Betatron Tune Spectra of High Intensity Bunched Beam in the SIS18**
R. Singh (GSI), O. Boine-Frankenheim, O. Chorniy, P. Forck, W. Kaufmann, P. Kowina, K. Lang (GSI) T. Weiland (TEMF, TU Darmstadt)

TUO1C06 16:10 **Instrumentation Developments and Beam Studies for the Fermilab Proton Improvement Plan Linac Upgrade and New RFQ Front-End**
V.E. Scarpine (Fermilab), D.S. Bollinger, K.L. Duel, N. Eddy, P.R. Karns, W. Pellico, C.-Y. Tan, R.E. Tomlin (Fermilab)

16:40–18:00 WG-E Discussions — R. Doelling (PSI) — Ballroom

Examples (Conference Guide & Abstracts 2011)

10-Oct-11	15:30 – 16:20	Plenary Oral	Auditorium

MODAU — Process Tuning and Feedback Systems
Chair: M. Lonza (ELETTRA)

MODAULT01 15:30 **TMT Adaptive Optics Computing Challenges** – *C. Boyer (TMT), B.L. Ellerbroek, L. Gilles, L. Wang (TMT) S. Browne (The Optical Sciences Company) G.J. Hovey (DRAO)*

The Thirty Meter Telescope (TMT) will be used with Adaptive Optics (AO) systems to allow near diffraction-limited performance in the near-infrared and achieve the main TMT science goals. Adaptive optics systems reduce the effect of the atmospheric distortions by dynamically measuring the distortions with wavefront sensors, performing wavefront reconstruction with a Real Time Controller (RTC), and then compensating for the distortions with wavefront correctors. The requirements for the RTC subsystem of the TMT first light AO system will represent a significant advance over the current generation of astronomical AO control systems. Memory and processing requirements would be at least 2 orders of magnitude greater than the currently most powerful AO systems using conventional approaches, so that innovative wavefront reconstruction algorithms and new hardware approaches will be required. In this paper, we will first present the requirements and challenges for the RTC of the first light AO system, together with the algorithms that have been developed to reduce the memory and processing requirements, and then two possible hardware architectures based on Field Programmable Gate Array (FPGA).

MODAUI002 15:50 **Global Real Time Functions of the"Plasma Syste": Plasma Control and Machine Protection** – *F. Sartori (F4E), M. Cavinato (F4E) G. De Tommasi (CREATE) A. Neto (IPFN)*

One of the most promising lines of research in the area of energy generation by means of nuclear fusion is Tokamak high temperature magnetic fusion. Tokamak devices are complex machines where very hot plasma is formed, controlled and heated thanks to collaboration of several systems. Many of these systems are involved directly with the management of the plasma and the reaching of the target fusion performances: diagnostics, machine instrumentation, plasma heating systems, and magnets. Especially close and real-time coordination among these systems and the plasma is required for safe and efficient operation of the device. This overall"plasma syste" has recently emerged as one of the most important areas of research and development as performance in a large and advanced tokamak device strongly depends on it. This talk will first provide an introductory overview to the"plasma syste" especially highlighting its most important requirements. The focus will then be then given to the functions required to support real time coordination among the systems: plasma control and machine protection. The talk will try to exemplify the range of problems encountered in this area using JET experience as a model. Finally an example of present architecture and a methodology addressing the above problems will be presented.

10-Oct-11	17:00 – 17:30	Mini oral	Auditorium

MOMAU — Mini Orals A
Chair: J.M. Meyer (ESRF)

Data and information management

MOMAU002 **Improving Data Retrieval Rates Using Remote Data Servers** – *T. D'Ottavio (BNL), B. Frak, J. Morris, S. Nemesure (BNL)*

The power and scope of modern Control Systems has led to an increased amount of data being collected and stored, including data collected at high (kHz) frequencies. One consequence is that users now routinely make data requests that can cause gigabytes of data to be read and displayed. Given that a users patience can be measured in seconds, this can be quite a technical challenge. This paper explores one possible solution to this problem - the creation of remote data servers whose performance is optimized to handle context-sensitive data requests. Methods for increasing data delivery performance include the use of high speed network connections between the stored data and the data servers, smart caching of frequently used data, and the culling of data delivered as determined by the context of the data request. This paper describes decisions made when constructing these servers and compares data retrieval performance by clients that use or do not use an intermediate data server.

MOMAU003 **The Computing Model of the Experiments at PETRA III** – *T. Kracht (DESY), M. Flemming, T. Nunez, A. Rothkirch, F. Schluenzen, P. van der Reest (DESY)*

The PETRA storage ring at DESY in Hamburg has been refurbished to become a highly brilliant synchrotron radiation source (now named PETRA III). Commissioning of the beamlines started in 2009, user operation in 2010. In comparison with our DORIS beamlimes, the PETRA III experiments have larger complexity, higher data rates and require an integrated system for data storage and archiving, data processing and data distribution. Tango [1] and Sardana [2] are the main components of our online control system. Both systems are developed by international collaborations. Tango serves as the backbone to operate all beamline components, certain storage ring devices and equipment from our users. Sardana is an abstraction layer on top of Tango. It standardizes the hardware access, organizes experimental procedures, has a command line interface and provides us with widgets for graphical user interfaces. Other clients like Spectra, which was written for DORIS, interact with Tango or Sardana. Modern 2D detectors create large data volumes. At PETRA III all data are transferred to an online file server which is hosted by the DESY computer center. Near real time analysis and reconstruction steps are executed on a CPU farm. A portal for remote data access is in preparation. Data archiving is done by the dCache [3]. An offline file server has been installed for further analysis and inhouse data storage.

*Examples (Conference Guide & Abstracts 2011)

WEMMU004 **SPI Boards Package, a New Set of Electronic Boards at Synchrotron SOLEIL** – *Y.-M. Abiven (SOLEIL), P. Betinelli, J. Bisou, F. Blache, A. Chattou, J. Coquet, N. Leclercq, P. Monteiro, G. Renaud, J.P. Ricaud (SOLEIL)*
SOLEIL is a third generation Synchrotron radiation source located in France near Paris. At the moment, the Storage Ring delivers photon beam to 23 beamlines. Since machine and beamlines improve their performance, new requirements are identified. On the machine side, new implementation for feedforward of electromagnetic undulators is required to improve beam stability. On the beamlines side, a solution is required to synchronize data acquisition with motor position during continuous scan. In order to provide a simple and modular solution for these applications requiring synchronization, the electronic group developed a set of electronic boards called"SPI board packag". In this package, the boards can be connected together in daisy chain and communicate to the controller through a SPI* Bus. Communication with control system is done via Ethernet. At the moment the following boards are developed: a controller board based on a Cortex M3 MCU, 16bits ADC board, 16bits DAC board and a board allowing to process motor encoder signals based on a FPGA Spartan III. This platform allows us to embed process close to the hardware with open tools. Thanks to this solution we reach the best performances of synchronization.

Infrastructure management and diagnostics

WEMMU005 **Fabric Management with Diskless Servers and Quattor in LHCb** – *L. Brarda (CERN), E. Bonaccorsi, G. Moine, P. Schweitzer (CERN)*
Large scientific experiments nowadays very often are using large computer farms to process the events acquired from the detectors. In LHCb a small sysadmin team manages 1400 servers of the LHCb Event Filter Farm, but also a wide variety of control servers for the detector electronics and infrastructure computers : file servers, gateways, DNS, DHCP and others. This variety of servers could not be handled without a solid fabric management system. We choose the Quattor toolkit for this task. We will present our use of this toolkit, with an emphasis on how we handle our diskless nodes (Event filter farm nodes and computers embedded in the acquisition electronic cards). We will show our current tests to replace the standard (RedHat/Scientific Linux) way of handling diskless nodes to fusion filesystems and how it improves fabric management.

WEMMU006 **Management Tools for Distributed Control System in KSTAR** – *S. Lee (NFRI), J.S. Park, M.K. Park, S.W. Yun (NFRI)*
The integrated control system of the Korea Superconducting Tokamak Advanced Research (KSTAR) is a real-time distributed control system based on EPICS framework, and has the essential roles of remote operation and supervising of tokamak device, and conducting of plasma experiments without any interruption. Therefore the availability of the control system directly affects the entire device performance. For the non-interrupted operation of the control system, we developed a tool named as Control System Monitoring (CSM) to monitor the resources of EPICS IOC servers (utilization of memory, cpu, disk, network, user-defined process and system-defined process), the soundness of storage systems (storage utilization, storage status), the status of network switches using Simple Network Management Protocol (SNMP), the network connection status of every local control sever using Internet Control Management Protocol (ICMP), and the operation environment of the main control room and the computer room (temperature, humidity, electricity) in real time

and to raise alarms to operators. When abnormal conditions or faults are detected by the CSM, it alerts the operators. Among the faults, if the critical fault relating to data storage should happen the process failover module of the CSM is executed in the redundant server and minimizes the data loss. In addition to CSM, the channel archiver scheduler stops and runs the data storing process according to the user-defined policy.

Protection and safety systems

WEMMU007 **Reliability in a White Rabbit Network** – *M.M. Lipinski (CERN), J. Serrano, T. Wlostowski (CERN) C. Prados (GSI)*
White Rabbit (WR) is a time-deterministic, low-latency Ethernet-based network which enables transparent, sub-ns accuracy timing distribution. It is being developed to replace the General Machine Timing (GMT) system currently used at CERN and will become the foundation for the control system of the Facility for Antiproton and Ion Research (FAIR) at GSI. High reliability is an important issue in WR's design, since unavailability of the accelerator's control system will directly translate into expensive downtime of the machine. A typical WR network is required to lose not more than a single message per year. Due to WR's complexity, the translation of this real-world-requirement into a reliability-requirement constitutes an interesting issue on its own: a WR network is considered functional only if it provides all its services to all its clients at any time. This paper defines reliability in WR and describes how it was addressed by dividing it into sub-domains: deterministic packet delivery, data redundancy, topology redundancy and clock resilience. The studies show that the Mean Time Between Failure (MTBF) of the WR Network is the main factor affecting its reliability. Therefore, probability calculations for different topologies were performed using the"Fault Tree analysi" and analytic estimations. Results of the study show that the requirements of WR are demanding. Design changes might be needed and further in-depth studies required, e.g. Monte Carlo simulations. Therefore, a direction for further investigations is proposed.

WEMMU009 **Status of the CERN's RBAC Infrastructure and Lessons Learnt from its Deployment in LHC** – *I. Yastrebov (CERN), P. Charrue, W. Sliwinski (CERN)*
The distributed control system for the LHC accelerator poses many challenges due to its inherent heterogeneity and highly dynamic nature. One of the important aspects is to protect the machine against unauthorised access and unsafe operation of the control system, from the low-level front-end machines up to the high-level control applications running in the control room. In order to prevent an unauthorized access to the control system and accelerator equipment and to address the possible security issues, the Role Based Access Control (RBAC) project was designed and developed at CERN, with a major contribution from Fermilab laboratory. Furthermore, RBAC became an integral part of the CERN Controls Middleware (CMW) infrastructure and it was deployed and commissioned in the LHC operation in the summer 2008, well before the first beam in LHC. This paper presents the current status of the RBAC infrastructure, together with an outcome and gathered experience after a massive deployment in the LHC operation. Moreover, we outline how the project evolved over the last two years and give an overview of the major extensions introduced to improve integration, stability and its functionality. The paper also describes the plans of future project evolution and possible extensions, based on gathered users requirements and operational experience.

*Examples (Conference Guide & Abstracts 2011)

14-Oct-11	14:45 – 15:30	Plenary Oral	Auditorium

FRDAU — Closing Session
Chair: A. Gotz (ESRF)

FRDAUI001 14:45 **ICALEPCS 2011 highlights** – *J.M. Chaize (ESRF)*
wrap up of the ICALEPCS 2011. Main strams, keywords, highlights

FRDAUI002 15:05 **ICALEPCS 2013** – *C.D. Marshall (LLNL)*
Presentation of the ICALEPCS 2013 organisation and venue

FRDAUI003 15:15 **ICALEPCS 2015** – *L. Corvetti (ASCo)*
Abstract: The Australian Synchrotron (AS) wishes to contribute to the ICALEPCS series by hosting it in Melbourne, Australia in 2015. The AS will be supported by Australia's highly respected science and technology organisations, ANSTO, CSIRO and ANU with a desire to participate in the continuing success of ICALEPCS. The AS, a 3GeV third generation Synchrotron light source has been in operation since 2007 with expansion plans for new beamlines and further capability. Melbourne, a multicultural, safe and friendly city is an ideal location to host the ICALEPCS in 2015.

FRDAUKP04 15:25 **ICALEPCS 2011 Official Closing Ceremony** – *A. Gotz (ESRF)*
ICALEPCS2011 official closing ceremony

Boldface papercodes indicate primary authors

*Examples (Abstract booklet IPAC2012)

21-May-12 09:30 – 10:00 Invited Oral Hall B (Plenary)

MOXAP — Invited Oral Presentation (Synchrotron Light Sources and FELs)

Chair: V.P. Suller (LSU/CAMD)

MOXAP01 09:30 **The Scientific Revolution Enabled by X-ray Free Electron Lasers** – *J. Stohr (SLAC)*
This talk outlines how the advent of x-ray free electron lasers (X-FELs) has fundamentally changed x-ray science and is envisioned to enable the solution of important scientific problems that impact human life. While we are still exploring how to understand the interactions of the ultra-strong and ultra-short FEL x-ray pulses with matter and developing methods of improved control of the pulse properties, we are already using FEL x-rays for the solution of important problems in such areas as life science and health, the generation and storage of energy and the understanding of technological processes and their limits imposed by the laws of nature. This talk will review the present state of the dynamic and exciting development of X-FEL science and provide a glimpse of the future.

21-May-12 10:00 – 10:30 Invited Oral Hall B (Plenary)

MOXBP — Invited Oral Presentation (Circular and Linear Colliders)

Chair: V.P. Suller (LSU/CAMD)

MOXBP01 10:00 **The First Two Years of LHC Operation** – *S. Myers (CERN)*
The operational performance of the LHC machine both for proton and lead ion operation are reviewed for the period 2010 and up the present. The beam parameter path allowing the very high rate of collider performance is presented and discussed. The accelerator issues encountered and those somewhat surprisingly not encountered are also discussed. The short and longer term plans for the LHC are also briefly presented.

21-May-12 11:00 – 11:30 Invited Oral Hall B (Plenary)

MOYAP — Invited Oral Presentation (Applications of Accelerators)

Chair: S. Henderson (Fermilab)

MOYAP01 11:00 **Accelerator Driven Systems** – *D. Vandeplassche (SCK-CEN)*
Accelerator Driven Systems are promising tools for the efficient transmutation of nuclear waste products in dedicated industrial installations (transmuters). The Myrrha project at Mol, Belgium, placed itself on the path towards these applications with a multipurpose and versatile system based on a liquid PbBi (LBE) cooled fast reactor (80 MWth) which may be operated in both critical and subcritical modes. In the latter case the core is fed by spallation neutrons obtained from a 600 MeV proton beam hitting the LBE coolant/target. The accelerator providing this beam is a CW superconducting linac which is laid out for the highest achievable reliability. The combination of a redundant and of a fault tolerant scheme should allow obtaining an MTBF value in excess of 500 hours that is required for optimal integrity and successful operation of the ADS. Myrrha is expected to be operational in 2023. The forthcoming 4-year period is fully dedicated to R&D activities, and in the field of the accelerator they are entirely focused on the reliability aspects.

21-May-12 11:30 – 12:00 Invited Oral Hall B (Plenary)

MOYBP — Invited Oral Presentation (Accelerator Technology)

Chair: S. Henderson (Fermilab)

MOYBP01 11:30 **State-of-the-Art and Future Prospects in RF Superconductivity** – *K. Saito (KEK)*
This presentation should recount the remarkable progress in improving the performance of superconducting cavities over the past 50 years and explore future directions, including advances in materials other than Nb, such as MgB2 and novel multi-layer superconductor-insulator systems. This talk should provide an overview of international activities.

*Examples (Abstract booklet IPAC2012)

Examples (Conference Guide IPAC2012)

MOPPC077 **Simulation and Analysis of the Beam Signal in Taiwan Photon Source Booster** – *C.C. Chiang (NSRRC), H.-P. Chang, P.J. Chou (NSRRC)*

02 Synchrotron Light Sources and FELs

MOPPC078 **Simulation Studies of Injection Scheme in TPS Storage Ring** – *Y.C. Lee (NSRRC), H.-P. Chang, P.J. Chou (NSRRC)*

05 Beam Dynamics and Electromagnetic Fields

MOPPC079 **Space-Charge Calculations in the EMMA ns-FFAG Ring Using GPT** – *R.T.P. D'Arcy (UCL) B.D. Muratori (STFC/DL/ASTeC) S.B. van der Geer (Pulsar Physics)*

MOPPC080 **Modeling Space Charge in an FFAG with Zgoubi** – *S.C. Tygier (UMAN), R. Appleby, H.L. Owen (UMAN) R.J. Barlow (University of Huddersfield)*

MOPPC081 **Simulation of RF Dark Current in the Presence of a Helical Magnetic Field** – *G.V. Romanov (Fermilab), V.S. Kashikhin (Fermilab)*

MOPPC082 **Beam Dynamics Simulations in RFQ with CST Studio Suite** – *G.V. Romanov (Fermilab)*

MOPPC083 **Graphical User Interface for Accelerator Modeling** – *T.J. Roberts (Muons, Inc) P. Guèye (Hampton University)*

MOPPC084 **G4beamline Code Development** – *T.J. Roberts (Muons, Inc)*

MOPPC085 **An Integrated Green Function Poisson Solver for Rectangular Waveguides** – *R.D. Ryne (LBNL)*

MOPPC086 **Accelerator Simulation - Beyond High Performance Computing** – *S. James (LBNL), B.C. Li, K. Muriki, H. Nishimura, Y. Qin, K. Song, C. Sun (LBNL)*

MOPPC087 **The Invariant Spin Field in the Relativistic Heavy Ion Collider** – *D.T. Abell (Tech-X), D. Meiser (Tech-X) V.H. Ranjbar (BNL)*

MOPPC088 **GPU Accelerated Spin Tracking** – *D. Meiser (Tech-X), D.T. Abell (Tech-X) D.P. Barber (DESY) V.H. Ranjbar (BNL)*

MOPPC089 **CUDA Kernel Design for GPU-based Beam Dynamics Simulations** – *I.V. Pogorelov (Tech-X), K.M. Amyx, J. James (Tech-X) M. Borland, R. Soliday, Y. Wang (ANL)*

04 Hadron Accelerators

MOPPC090 **Coupling Modulator Simulations into an FEL Amplifier for Coherent Electron Cooling** – *I.V. Pogorelov (Tech-X), G.I. Bell, D.L. Bruhwiler, B.T. Schwartz (Tech-X) Y. Hao, V. Litvinenko, G. Wang (BNL)*

05 Beam Dynamics and Electromagnetic Fields

MOPPC091 **Parallel 3D Simulations to Support Commissioning of a Solenoid-based LEBT Test Stand** – *B.T. Schwartz (Tech-X), D.L. Bruhwiler, Y. Choi, S. Mahalingam, P. Stoltz (Tech-X) B. Han, M.P. Stockli (ORNL)*

04 Hadron Accelerators

MOPPC092 **Effects of 3D Dynamics in the Kicker Section of a Coherent Electron Cooling System** – *B.T. Schwartz (Tech-X), G.I. Bell, D.L. Bruhwiler, I.V. Pogorelov (Tech-X) Y. Hao, V. Litvinenko, G. Wang (BNL) S. Reiche (Paul Scherrer Institut)*

05 Beam Dynamics and Electromagnetic Fields

MOPPC093 **Optimal Fast Multipole Method Data Structures** – *S. Abeyratne (Northern Illinois University), B. Erdelyi (Northern Illinois University) S.L. Manikonda (ANL)*

MOPPC094 **Charge Density Estimation with Orthogonal Polynomials** – *D. Hernandez (Northern Illinois University)*

MOPPC095 **XAL's Online Model at ReA3 to Understand Beam Performance** – *C. Benatti (NSCL) P. Chu, M.J. Syphers (FRIB)*

MOPPC096 **Multiphysics Applications of ACE3P** – *K.H. Lee (SLAC), A.E. Candel, K. Ko, Z. Li, C.-K. Ng (SLAC)*

MOPPC097 **ACE3P – Parallel Electromagnetic Code Suite for Accelerator Modeling and Simulation** – *C.-K. Ng (SLAC), A.E. Candel, L. Ge, K. Ko, K.H. Lee, Z. Li, S. Oakley, G.L. Schussman, L. Xiao (SLAC) R. Ainsworth (Royal Holloway, University of London) R. Rodriguez (Muons, Inc)*

21-May-12 16:00 – 18:00 Poster Decatur St

MOPPD — Poster Session

04 Hadron Accelerators

MOPPD001 **Accelerator R&D in the QUASAR Group** – *C.P. Welsch (Cockcroft Institute) C.P. Welsch*

MOPPD002 **The Ultra-low Energy Storage Ring** – *C.P. Welsch (Cockcroft Institute), D. Newton, M.R.F. Siggel-King (Cockcroft Institute) O.E. Gorda, O. Karamyshev, M. Panniello, A.I. Papash (MPI-K) J. Harasimowicz, M. Putignano, C.P. Welsch*

06 Instrumentation, Controls, Feedback and Oper. Aspects

MOPPD003 **DITANET - An International Network in Beam Diagnostics** – *C.P. Welsch (Cockcroft Institute) C.P. Welsch*

05 Beam Dynamics and Electromagnetic Fields

MOPPD004 **oPAC - Optimizing Accelerators through International Collaboration** – *C.P. Welsch (Cockcroft Institute) C.P. Welsch*

04 Hadron Accelerators

MOPPD005 **Stochastic Cooling of Antiprotons in the Collector Ring at FAIR** – *C. Dimopoulou (GSI), A. Dolinskii, F. Nolden, C. Peschke, M. Steck (GSI) D. Möhl (CERN)*

MOPPD006 **Commissioning of the 2MeV Electron Cooler for COSY / HESR** – *V. Kamerdzhiev (FZJ), J. Dietrich (FZJ) M.I. Bryzgunov, A.D. Goncharov, V.M. Panasyuk, V.V. Parkhomchuk, V.B. Reva, D.N. Skorobogatov (BINP SB RAS)*

Examples (Pre-session abstract listing HB2012)

1101 **Numerical Calculation of Beam Coupling Impedances in the Frequency Domain for the SIS100 synchrotron for FAIR** – *U. Niedermayer (TEMF, TU Darmstadt), O. Boine-Frankenheim (TEMF, TU Darmstadt)*
The transverse impedance of kicker magnets is considered to be one of the main beam instability sources in the projected SIS-100 at FAIR and also in the SPS at CERN. The longitudinal impedance can contribute to the heat load, which is especially a concern in the cold sections of SIS-100 and LHC. In the high frequency range, time domain codes are commercially available to calculate the impedance but they become inapplicable at medium and low frequencies. We present the ongoing work of developing a Finite Integration (FIT) solver in frequency domain which is based on the Parallel and Extensible Toolkit for Scientific computing (PETSc) framework in C++. The code is applied to an inductive insert used to compensate the longitudinal space charge impedance in low energy machines. Another application focuses on the impedance contribution of a ferrite kicker with inductively coupled pulse forming network (PFN) and frequency dependent complex material permeability. In future we plan to confirm our simulations with dedicated wire or coil bench measurements.

1102 **Thermal effects in the transport of initially inhomogeneous beams** – *R. Pakter (IF-UFRGS), A. Endler, F.B. Rizzato, E.G. Souza (IF-UFRGS)*
We investigate the role of the temperature in the onset of singularities and the consequent breakdown of the fluid description in the transport of continuous, intense, inhomogeneous charged particle beams. In the cold beam limit, this system is shown to present wave breaking which is responsible for particle ejection from the beam core and formation of halo. Here, we develop a Lagrangian fluid model for the beam evolution that incorporates thermal effects using an adiabatic approximation. It is found that below a certain temperature threshold a different type of singularity that is responsible for the breakdown of the fluid description is present. Namely, a singular growth of the pressure gradient. As the threshold temperature is approached, however, the time for the occurrence of the singularity diverges and is found to be absent above it. In other words, the fluid model predicts the existence of a critical temperature that separates two different dynamical phases: a nonadiabatic transport at lower temperatures and a completely adiabatic evolution at higher temperatures. These findings are verified with the aid of self-consistent N-particle simulations.

1103 **Experimental Study of Beam Halo Formation due to Mismatch of the Intense Beam** – *H.D. Zhang (UMD), R.A. Kishek (UMD)*
Beam halo is a common phenomenon in particle beams, especially for modern, advanced accelerators where high beam intensities lead to strong space charge. It is generally understood as a population of particles which do or will reach large transverse radii relative to a more intense, centralized beam core. It is associated with emittance growth, the beam quality degrading and the beam loss. In illustrating halo formation, the most successful models are the particle-core model [1] and free energy model [2] which describe a parametric resonance due to envelope mismatch as the dominant cause for halo formation in the space charge regime. But few experiments have been carried out to test these theories and further modify them. In this paper, we present the design of an experiment to study halo formation from envelope mismatch for beams spanning a wide range of intensities in the University of Maryland Electron Ring (UMER) [3]. A new diagnostic for high-dynamic range halo measurements is also introduced [4]. Comparison of several beam parameters during halo formation process between theory and experiment will be discussed.

1121 **High energy electron cooling** – *V.B. Reva (BINP SB RAS), M.I. Bryzgunov, V.M. Panasyuk, V.V. Parkhomchuk (BINP SB RAS)*
The electron cooler of a 2 MEV for COSY storage ring FZJ is assembled in BINP. This paper describes the first experimental results from the electron cooler with electron beam and high voltage. The cooling section is designed on the classic scheme of low energy coolers like cooler CSRm, CSRe, LEIR that was produced in BINP before. The electron beam is transported inside the longitudinal magnetic field along whole trajectory from an electron gun to a collector. This optic scheme is stimulated by the wide range of the working energies 0.1(0.025)-2 MeV. The electrostatic accelerator consists of 34 individual unify section. Each section contains two HV power supply (plus/minus 30 kV) and power supply of the magnetic coils. The electrical power to each section is provided by the cascade transformer. The cascade transformer is the set of the transformer connected in series with isolating winding.

1142 **Medium Energy Beam transport Design Update For ESS** – *I. Bustinduy (ESS Bilbao) B. Cheymol, M. Eshraqi (ESS) J. Stovall (CERN)*
The major challenge of this part of the accelerator is to keep a high quality beam, with a pulse well defined in time, a low emittance and a minimized halo, so that the beam losses downstream the linac be limited and the overall ESS reliability be maximized. In order to minimize beam loss at high energy linac, and the consequent activation of components, a fast chopping scheme is presented for the medium energy beam transport section (MEBT). The considered versatile MEBT is being designed to achieve four main goals: First, to contain a fast chopper and its correspondent beam dump, that could serve in the commissioning as well as in the ramp up phases. Second, to serve as a halo scraping section by means of two adjustable blades. Third, to measure the beam phase and profile between the RFQ and the DTL, along with other beam monitors. And finally, to match the RFQ output beam characteristics to the DTL input both transversally and longitudinally. For this purpose a set of ten quadrupoles is used to match the beam characteristics transversally, combined with two 352.2 MHz buncher cavities, which are used to adjust the beam in order to fulfill the required longitudinal parameters.

1143 **Space charge suppression for flat beams** – *A.V. Burov (Fermilab) Y.S. Derbenev (JLAB)*
Benefits and problems for operation with flat beams are discussed.

1144 **Test of ferrite rings for CSNS/RCS RF cavities** – *H. Shi (IHEP), X. Li, W. Long, H. Sun, J.Y. Tang (IHEP)*
The measurement of ferrite rings provides very important information for designing the RF cavities and the whole RF system of CSNS/RCS. A new two-ring ferrite test system for the CSNS/RCS ferrite-loaded cavities has been developed. The test system includes the test bench, 3 kW valve power amplifier, 3000 A bias current source and LLRF control system. The characteristics of the ferrite rings in low and high RF field with dc and ac bias current were tested respectively with this system. The dependence of RF frequency on bias current is given. With the increasing of the repetition rate of ac bias current, the obvious dynamic loss was observed, and the additional bias current is required to achieve resonance.

1145 **Beam halo dynamics and control with hollow electron beams** – *G. Stancari (Fermilab)*
Experimental measurements of beam halo population and diffusion dynamics with collimator scans are reviewed. The concept of halo control with a hollow electron beam collimator, its demonstration at the Tevatron, and its possible applications at the LHC are discussed.

1161 **Physics design of the C-ADS main linac with two different injector schemes** – *F. Yan (IHEP), Z. Li, C. Meng, J.Y. Tang (IHEP)*
Two design schemes for the main linac of C-ADS (China Accelerator Driven Subcritical system) are presented in this paper. They are corresponding to two different injector schemes. Injector-II scheme makes use of room-temperature RFQ and superconducting HWR cavities with the RF frequency of 162.5 MHz; Injector-I scheme makes use of higher-energy RFQ and superconducting spoke cavities with the RF frequency of 325 MHz. At the first choice, a relatively smaller longitudinal emittance is adopted for the RFQ designs with both the injector schemes to obtain more efficient acceleration. However, compared with the injector-I scheme, with the injector-II scheme, bunch current will be doubled in the main linac due to the half RF frequency in the injector-II. This means stronger space charge effects. Alternate design for the main linac with the injector-II scheme is to increase the longitudinal emittance by 50% so that the space charge effects will be alleviated. However, totally 30 cavities more and 36 m longer in the main linac have to be paid for this design scheme. The design considerations, the lattice designs, the simulation results including halo information are presented.

1162 **Fiber Based BLM System R&D at CERN** – *E.B. Holzer (CERN), J.W. van Hoorne (CERN) S. Mallows (The University of Liverpool)*
The application of a beam loss measurement (BLM) system based on Cherenkov light generated in optical fibers to a linear accelerator with long bunch trains is currently under investigation at CERN. In the context of the Compact Linear Collider (CLIC) study, the machine protection role of the BLM system consists of its input to the 'next cycle permit'. In between two cycles it is determined whether it is safe to commit the machine for the next cycle. A model for light production and propagation has been developed and validated with beam measurements. Monte Carlo simulations of loss scenarios established the suitability in terms of sensitivity and dynamic range. Test set-ups of a Cherenkov fiber BLM system were installed at the CLIC Test Facility, CTF3. Model predictions and measurements will be presented: of the achievable longitudinal position resolution of the system, considering that the bunch trains and the optical fiber length are comparable in size; and of the possibility to distinguish between losses from the drive beam decelerator and the main linac, which run in parallel.

1164 **A method to measure the incoherent synchrotron frequencies in bunches.** – *O. Chorniy (GSI), H. Reeg (GSI)*
The method of measuring the incoherent synchrotron frequencies in a stationary bunch is presented. It can be shown that by measuring the local current at a fixed coordinate in RF bucket the corresponding incoherent synchrotron frequency can be obtained. Test calculations were done using simulation data where beam loading and space charge were included. The incoherent frequencies obtained with method are in a good agreement with theory. In real experiment, the incoherent frequencies were determined from bunch profiles recorded in the SIS18 with low intensity beam at injection energy. Bunch profiles were measured with a new Fast Current Transformer which has a relatively broad frequency range. The profiles were recorded using 8 bit resolution oscilloscope. The frequency spectra of local current fluctuation at different longitudinal positions were obtained numerically. The strongest lines in these spectra were at positions of theoretically expected incoherent frequencies. In this paper the method is described in details, the comparison of incoherent frequencies obtained from the simulation and measurement data with theoretical solutions is shown.

1166 **Resistive-wall Instability in the CSNS/RCS** – *L. Huang (IHEP), Y.D. Liu, S. Wang (IHEP)*
Rapid Cycling Synchrotron (RCS) of the China Spallation Neutron Source (CSNS) is a high intensity proton accelerator, with average beam power of 100kW. The collective effects caused by the coupling impedance may be the limit to beam power. The impedance estimation for components on beam line shows that the resistive wall impedance and its instability are more serious than any others. Based on the impedance budget, the instability is theoretically estimated. A simple resistive wall wake field model is used to simulate the bunch oscillation and obtain the growth rate. In this simulation model, the continuous resistive wall wake field is concentrated to one position in the ring and the long bunch is sliced into many micro-bunches. By tracking the dynamics of the macro-bunches, the transverse growth rates are obtained in 100kW and 200kW beam power, respectively. The simulation results are also confirmed the restriction to instability by natural chromaticity.

1167 **Error Analysis and Correction Scheme in C-ADS Injector-I** – *C. Meng (IHEP), Z. Li, C. Meng, J.Y. Tang (IHEP)*
C-ADS Injector-I is a 10mA 10MeV CW proton linac. It uses a 3.2MeV normal conducting 4-Vane RFQ and 12 superconducting single-Spoke cavities. According to the detailed sensitivity analysis of alignment and RF errors, the error tolerance of both static and dynamic ones for Injector-I are presented. The simulation results show that

*Examples (Pre-session author listing HB2012)

Boldface papercodes indicate primary authors

Conclusion

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