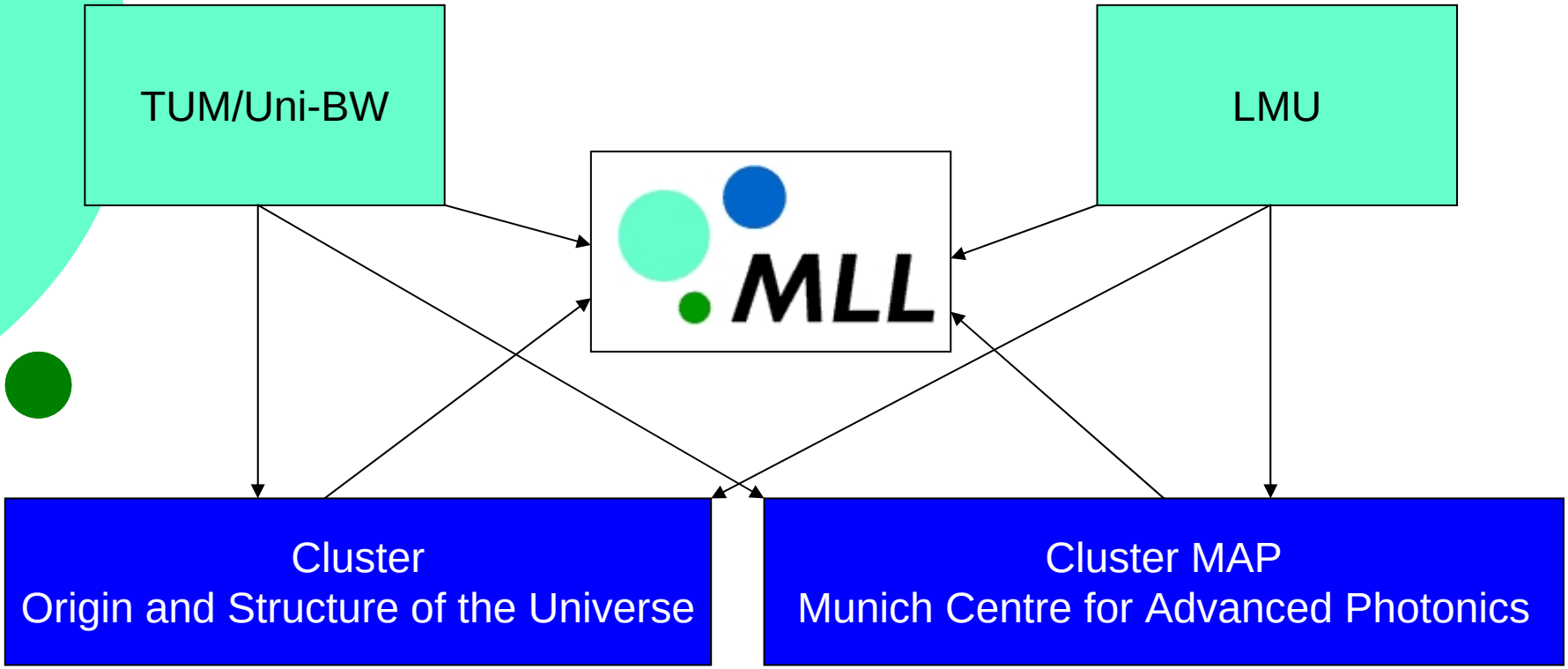
Maier-Leibnitz-Laboratorium
– Tandem Operation and Experiments –

- Structure of MLL
- Tandem operation
- Experiments

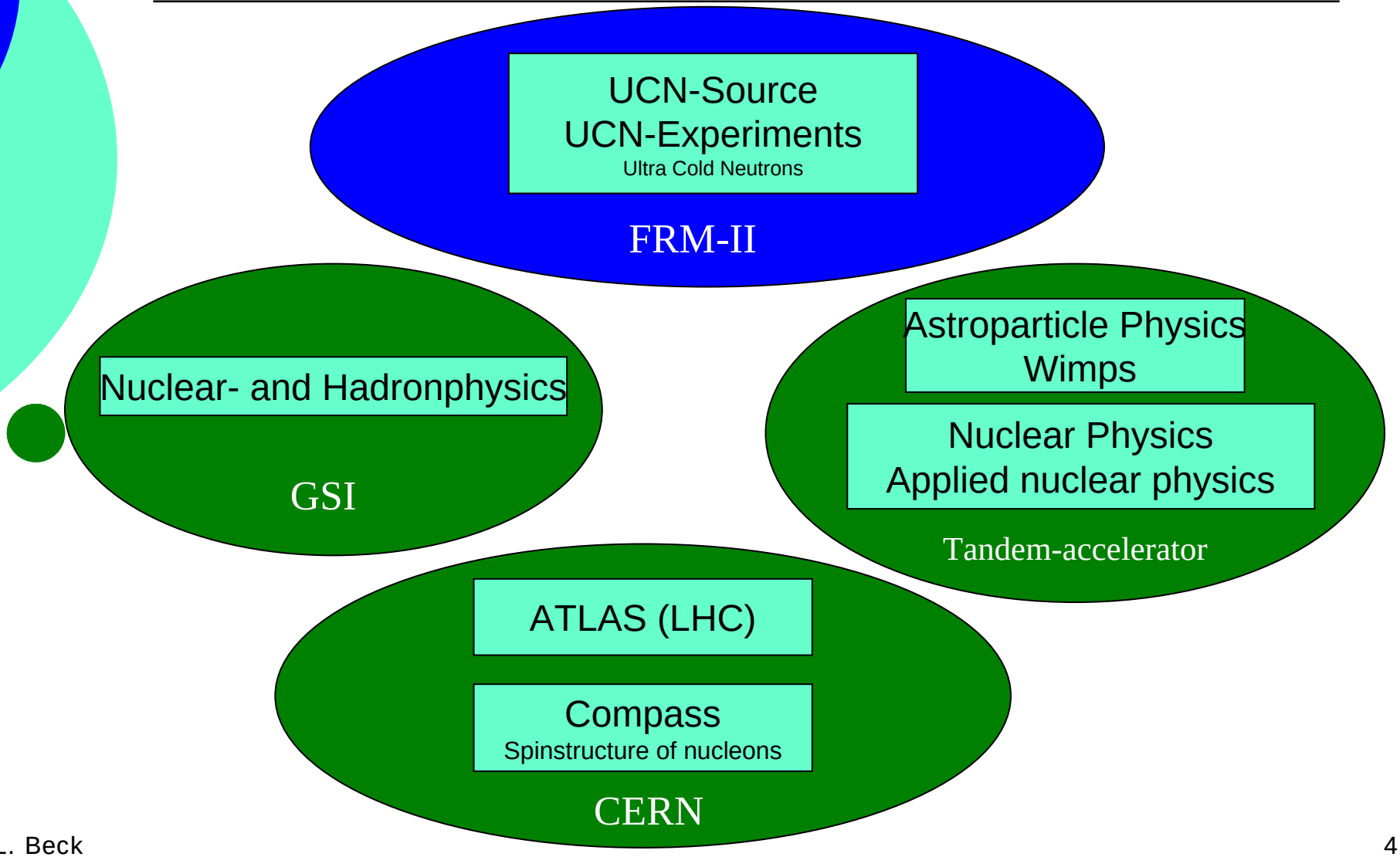
Maier-Leibnitz-Laboratorium für Kern- und Teilchenphysik
der Ludwig-Maximilians-Universität München
und der Technischen Universität München

Am Coulombwall 6
85748 Garching
Germany
Tel. 089/289-14271

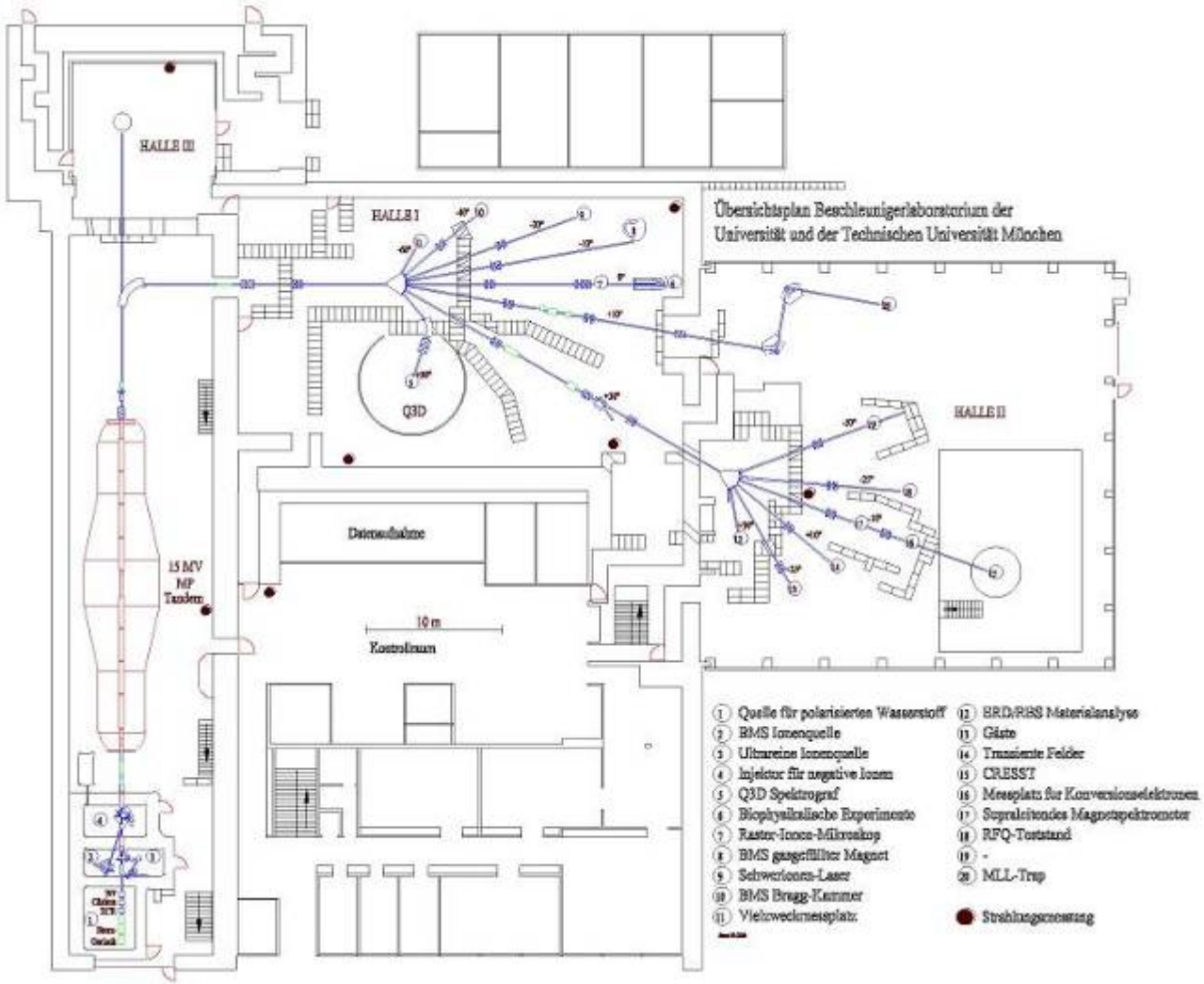
Who is involved?



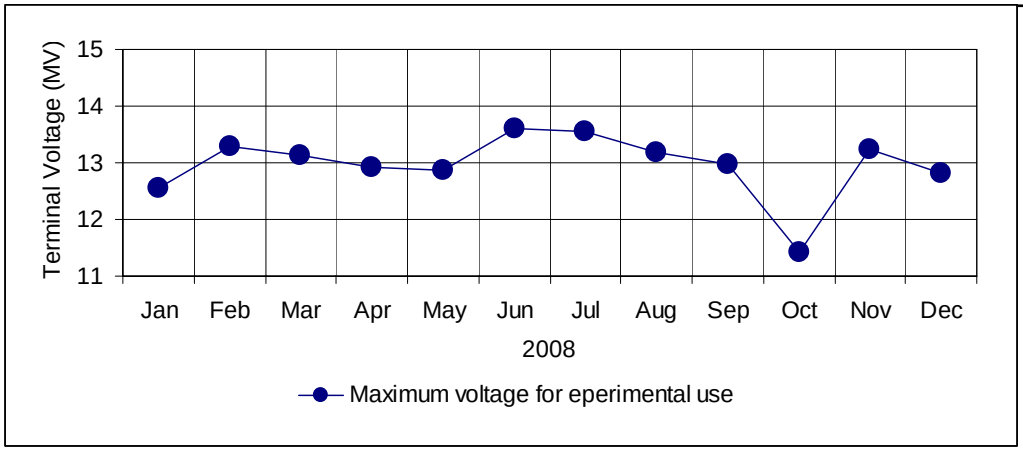
Where ?

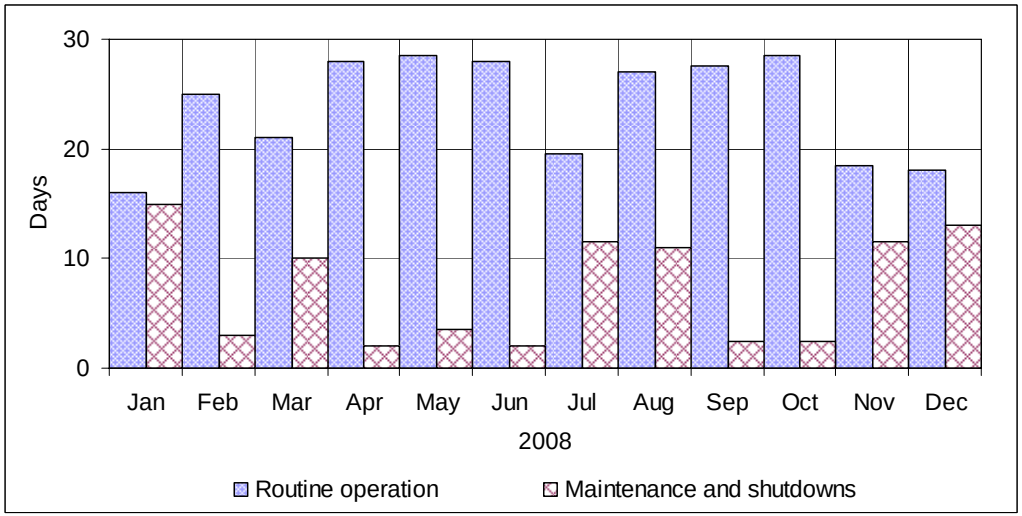

UCN-Source
UCN-Experiments
Ultra Cold Neutrons
FRM-II
Nuclear- and Hadronphysics
GSI
Astroparticle Physics
Wimps
Nuclear Physics
Applied nuclear physics
Tandem-accelerator
ATLAS (LHC)
Compass
Spinstructure of nucleons
CERN

Tandem Laboratory Outline



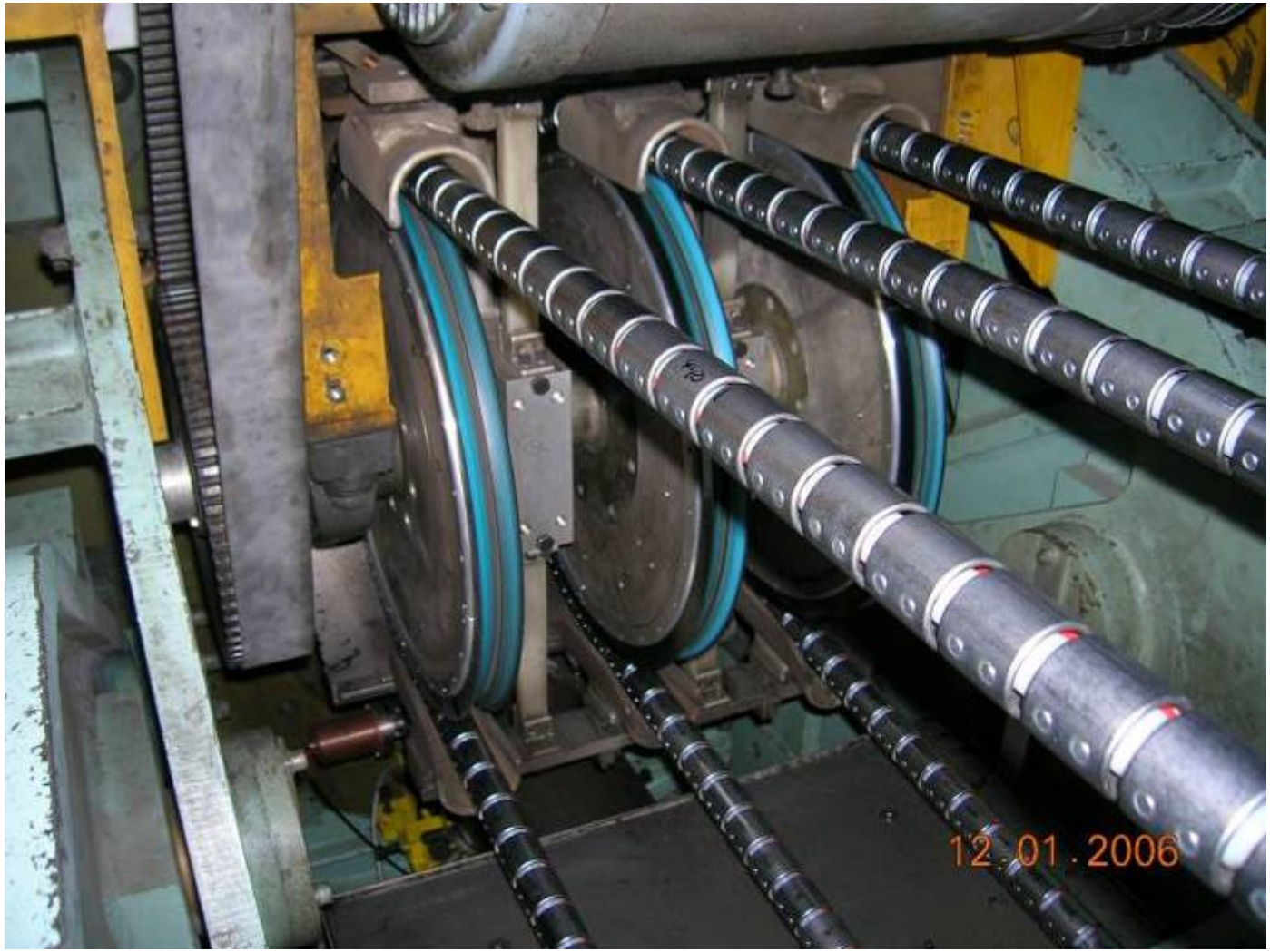
Operating statistics 2008



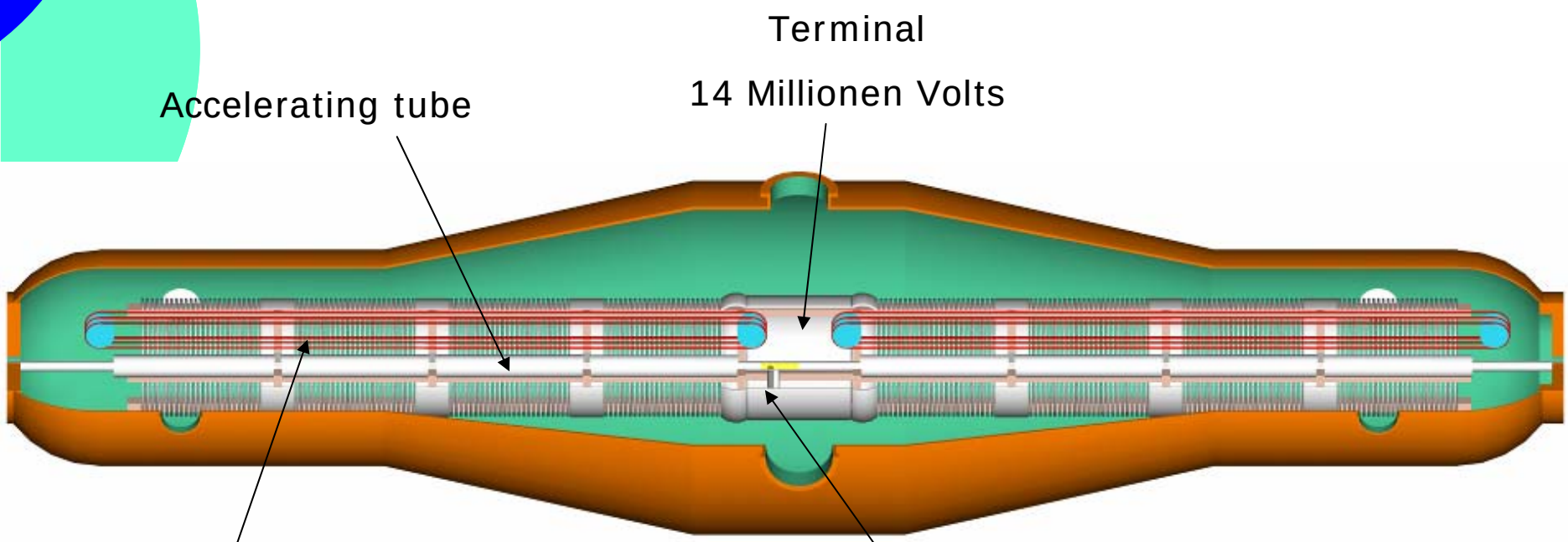


- Reliable operation 6600h
- ~13 MV

Charging Chains

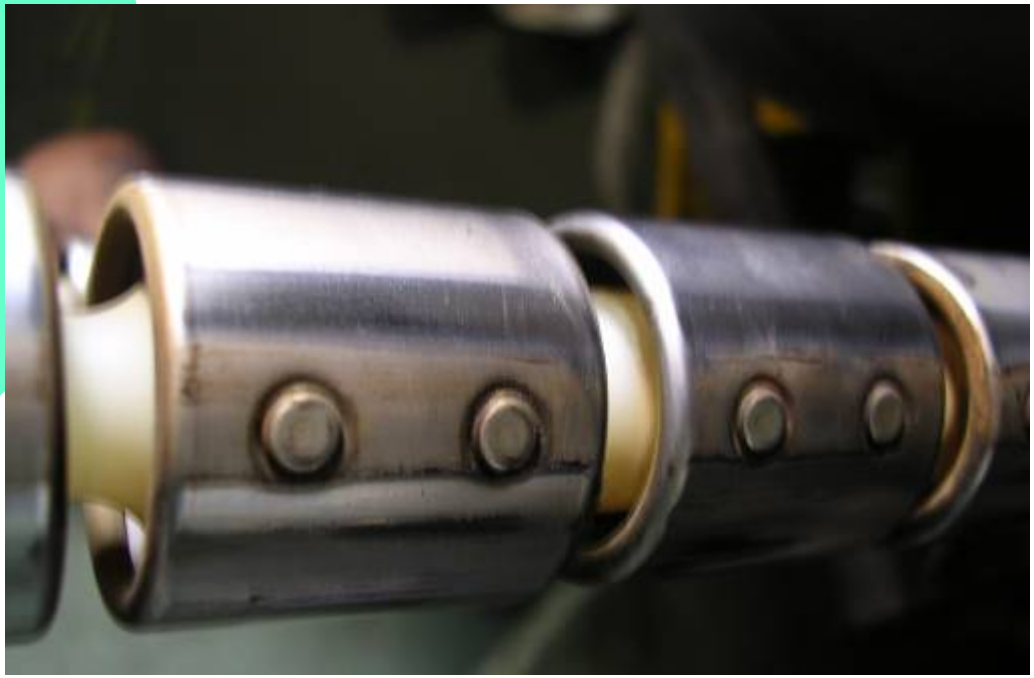


MP-Tandem van de Graaff®



2 sets of 3 charging chains

Replacement of HE Charging chains



Why?

Ripple in Terminal voltage correlate
with chain speed.

Installed September 1990 !

130 000 h of operation

Replaced April 2009

Replacement of LE Charging chains

Why?

Installed August 2005

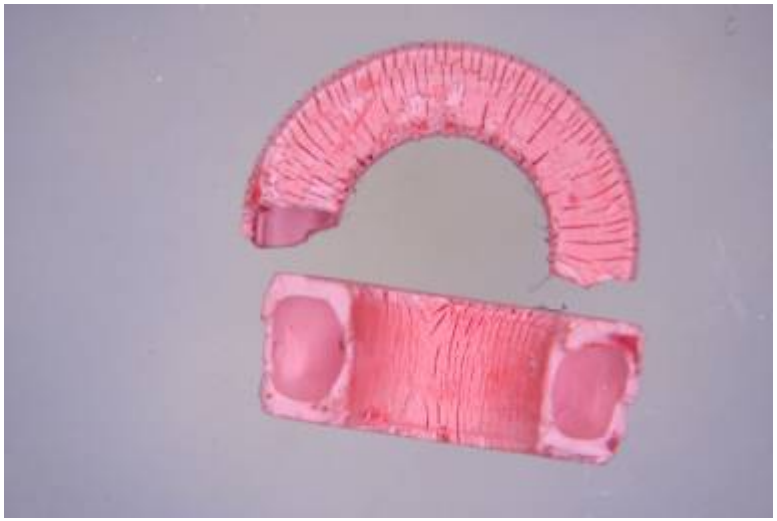
24 000 h of operation

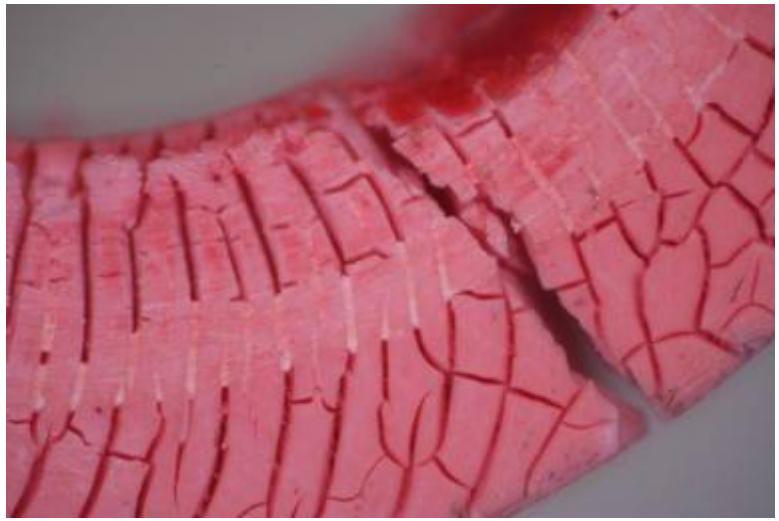
Replaced May 2009

LE-Chain Spacer Problem

- Installed 8/2005
- Replaced 5/2009

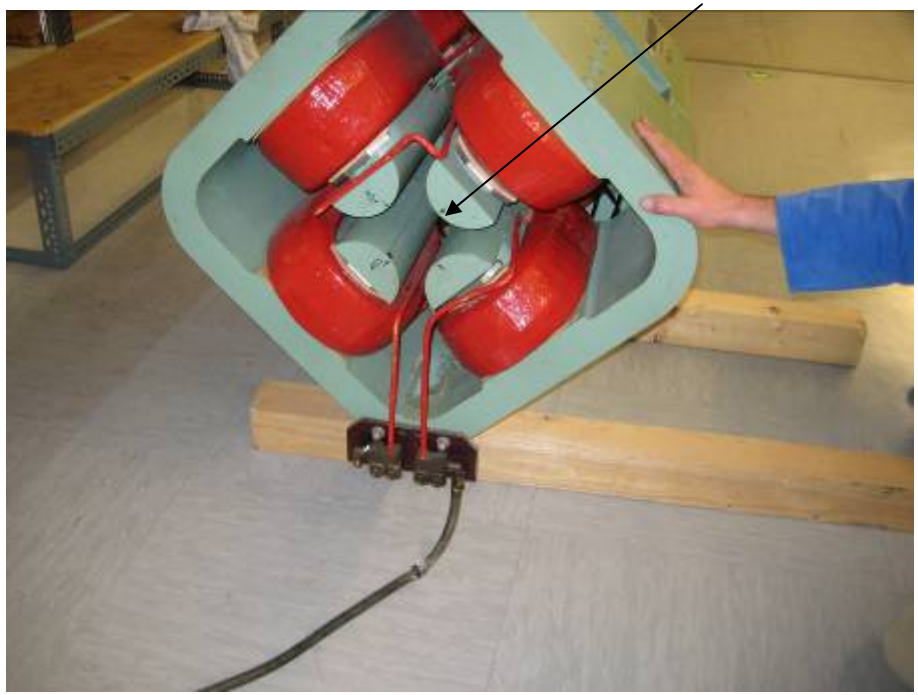
Delrin since 1993 (Nylon before)





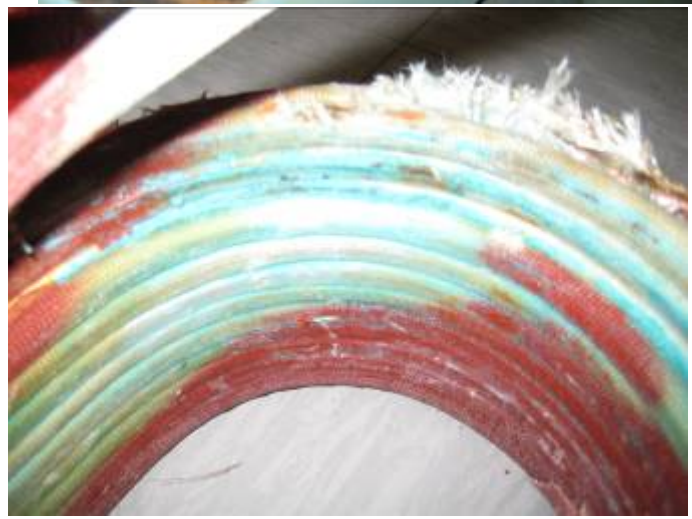
Lens 5 – Tank exit

beam at maschine exit with y-deviation?
Solution: y-steering



Lens 5

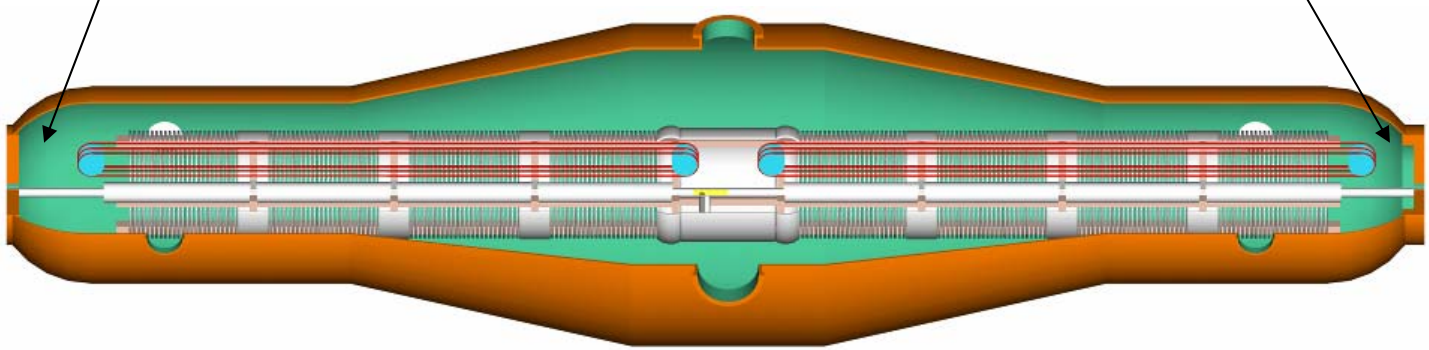
Resistance: 0,4 Ohms all
Inductance: good coil 800 µH – bad coil 150 µH



Replacement of all 4 coils in December 2008
(Spare coils from Heidelberg)

Idler Wheels - Storage

Storage in dry atmosphere!



SF6 – 2,5 t in 2008

From Vivitron
Company: Avantec

Scientific Council of MLL (March 2001):

The Tandem accelerator as a research machine should be phased out when MAFF becomes operational, as foreseen for 2004.

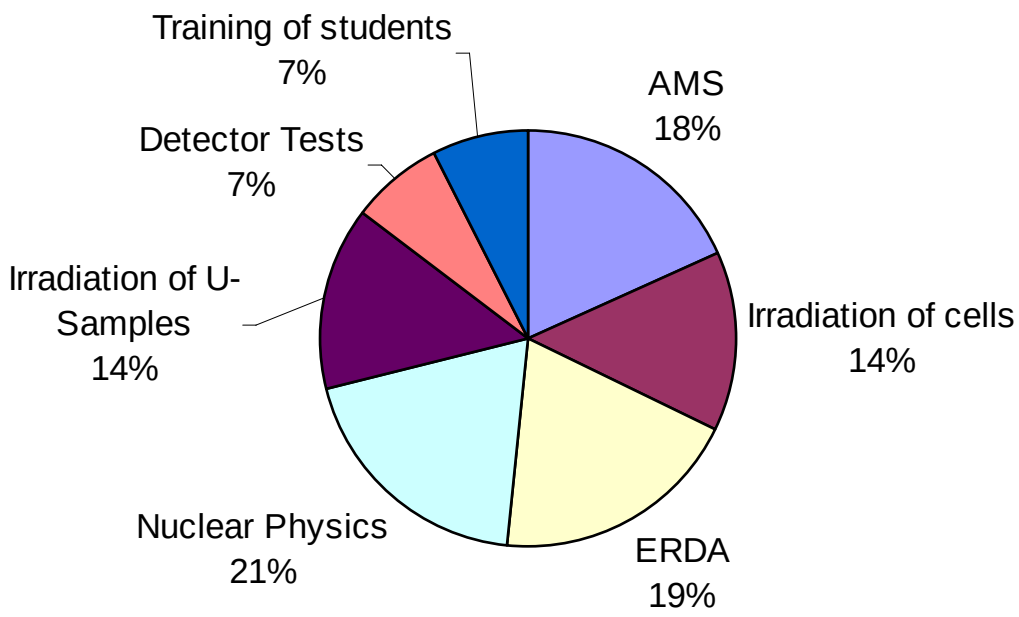
MAFF project stopped! No funding!

Part III: Experiments

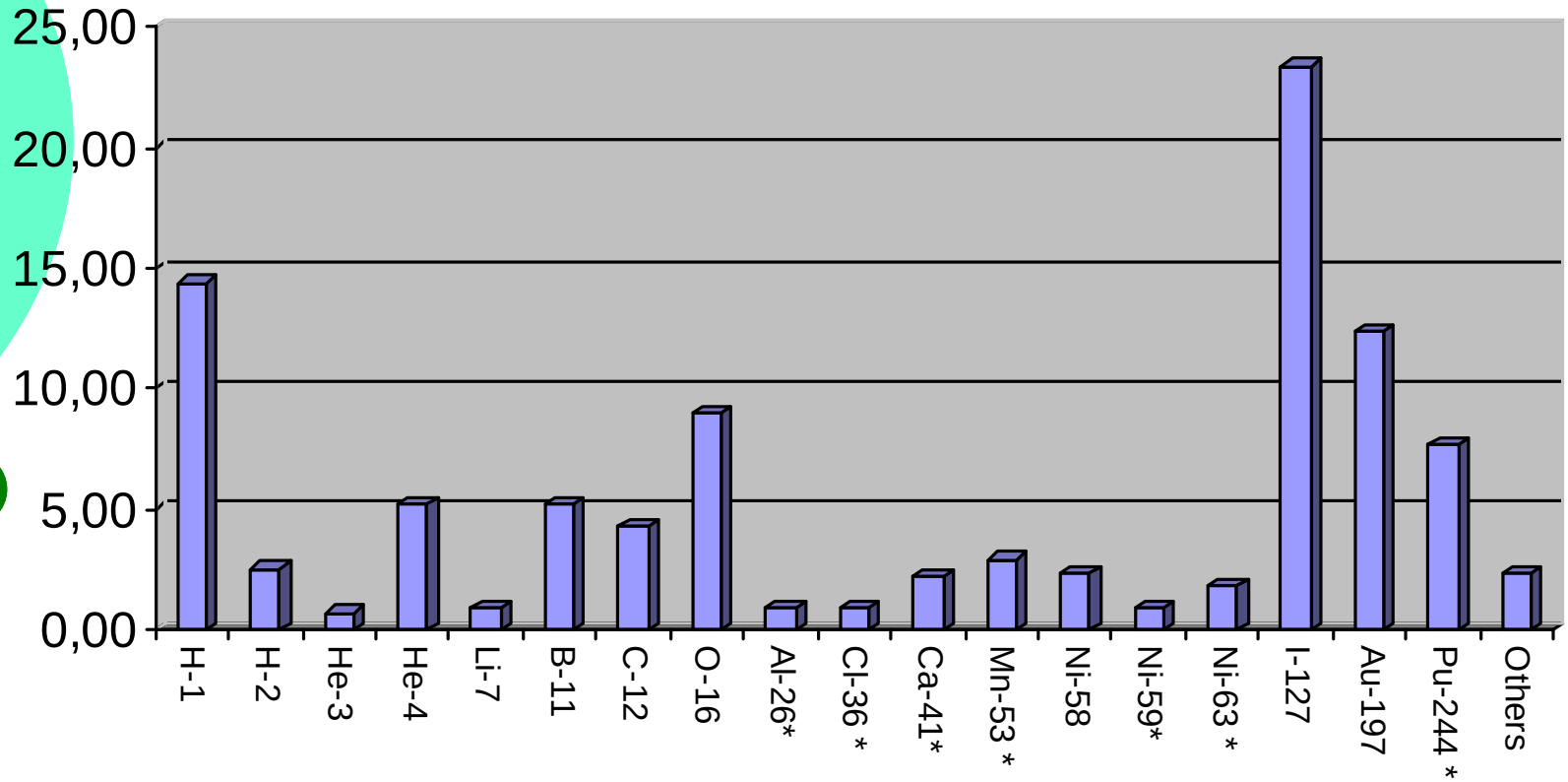
- Nuclear Physics
- Applied Physics

- Great demand for beamtime in the next years

Experiments 2008

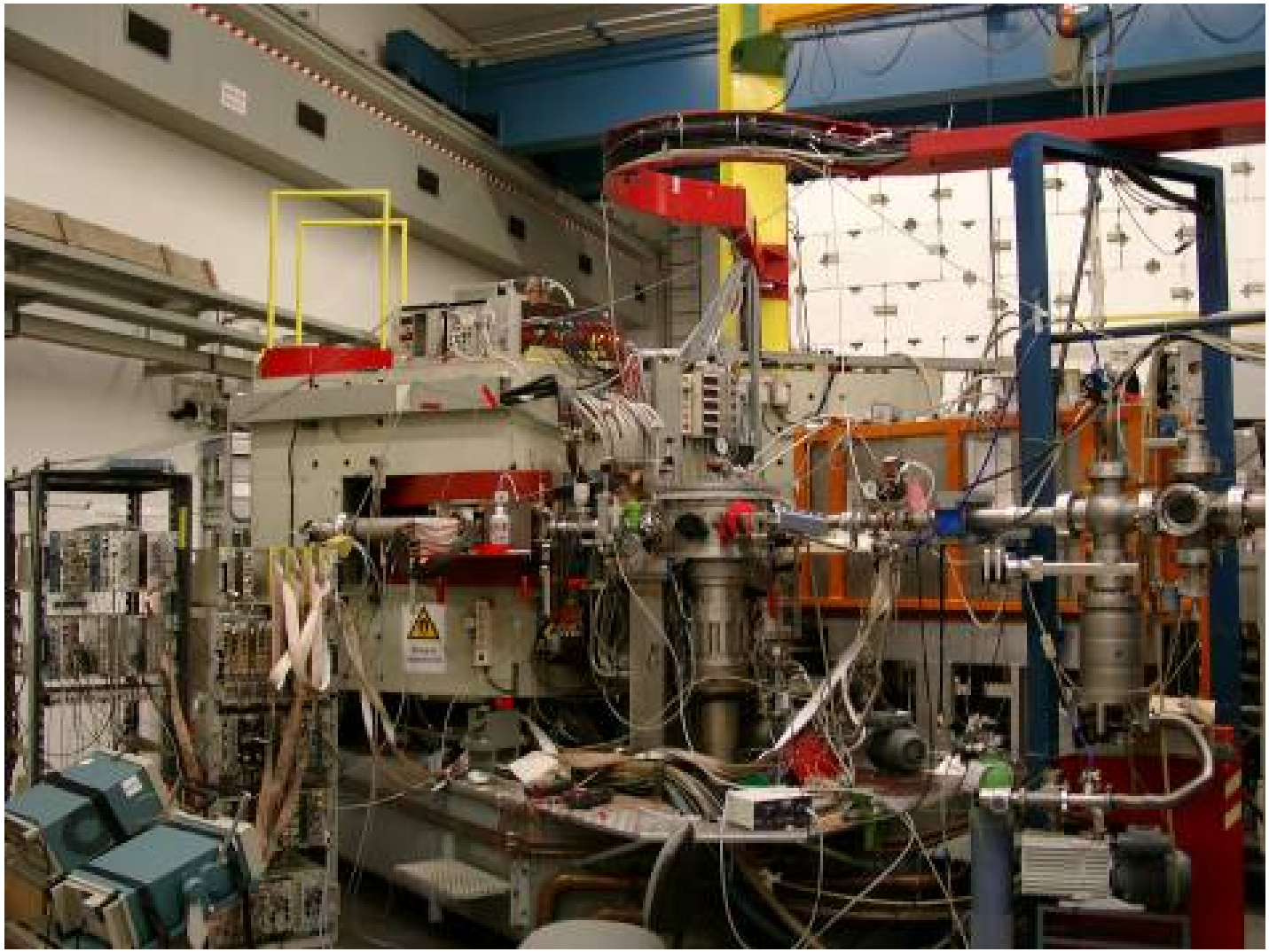


Ion Beam Time 2008

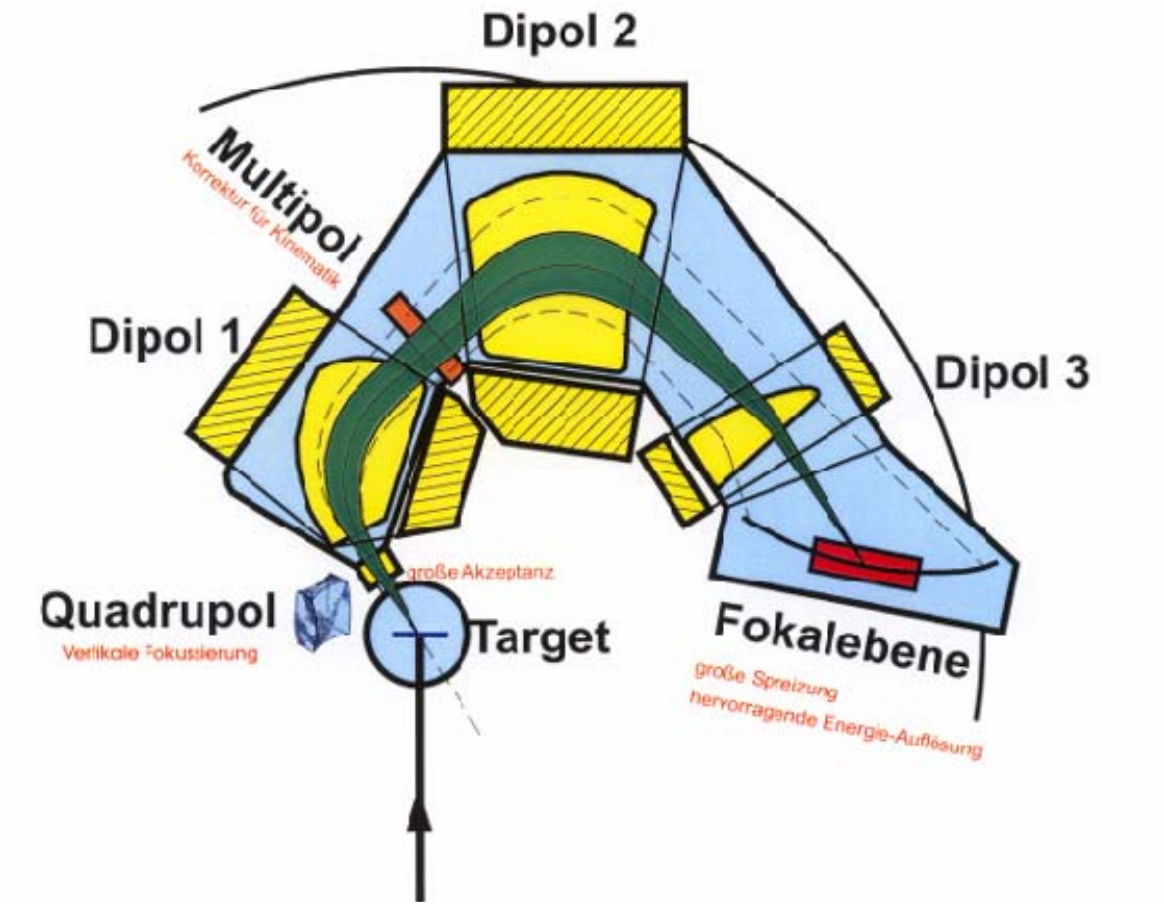


Ion beam time in percent of total available beam time.
Isotopes marked with an * were measured in AMS studies

Q3D – Magnetic spectrograph

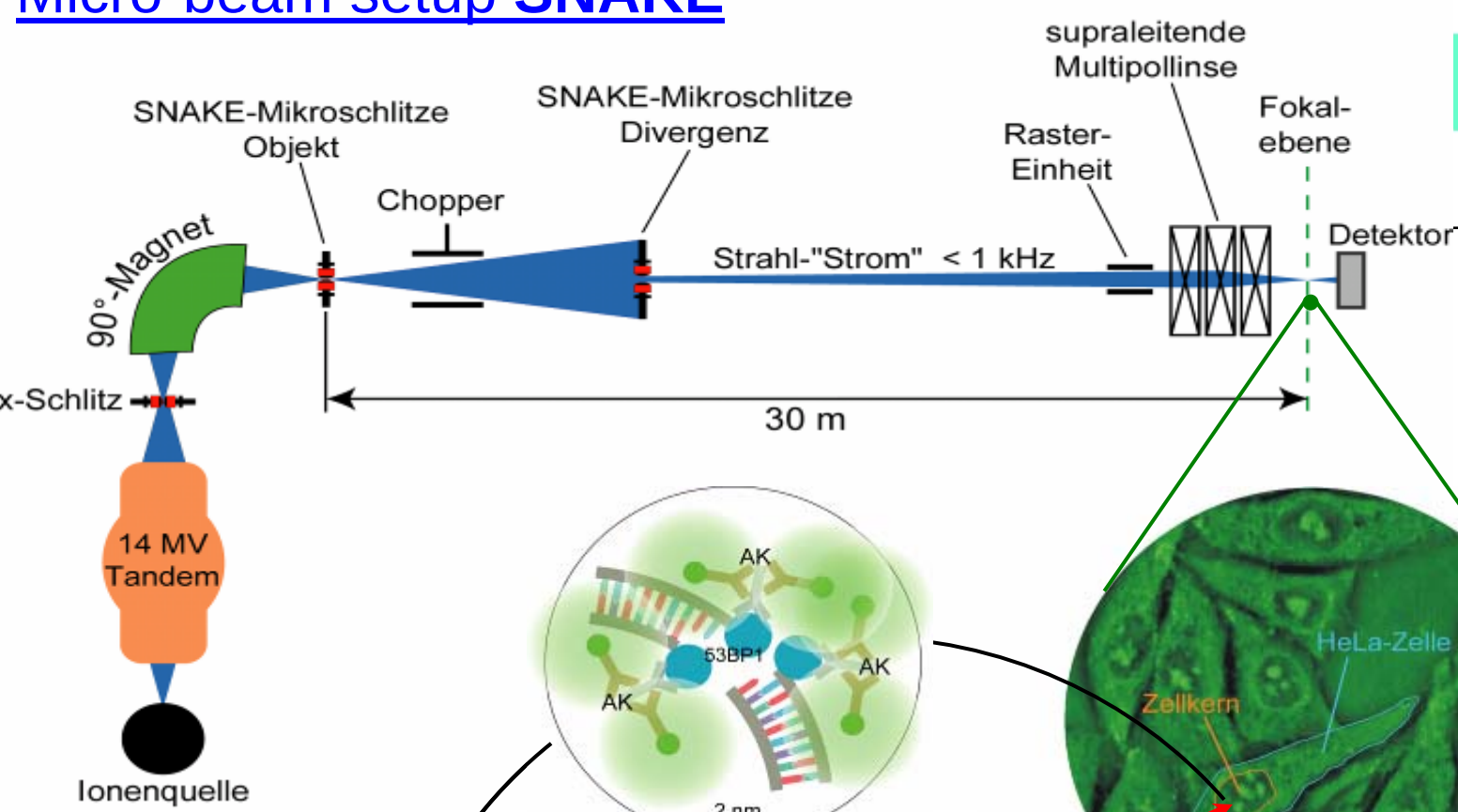


Q3D - Principle



- High resolution nuclear physics
- ERDA

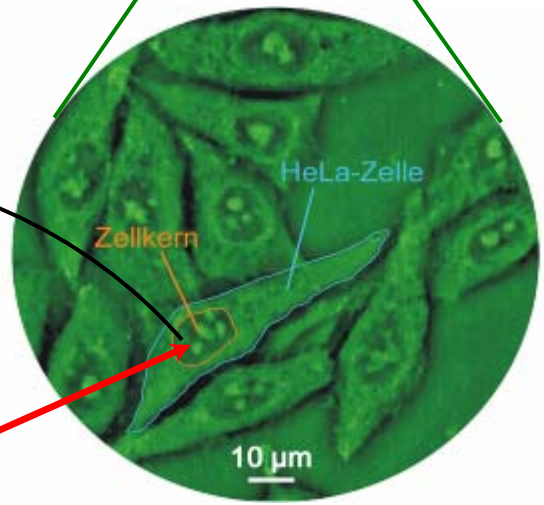
Micro-beam setup **SNAKE**

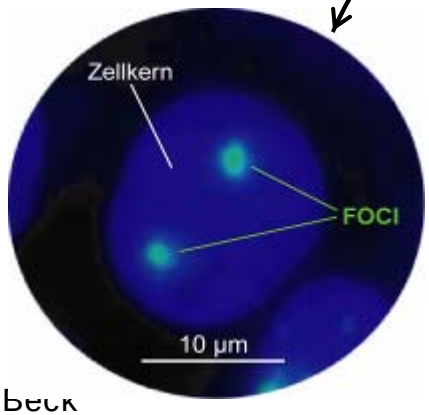


MLL

Supraleitendes
Nanoskop
für **a**ngewandte
kernphysikalische
Experimente

Biochemische Markierung
der Schäden
im Erbgut DNA





Irradiation of living cells with single ions.
Study of DNA – repair mechanisms.

Spirit

Support of Public and Industrial Research using Ion beam Technology

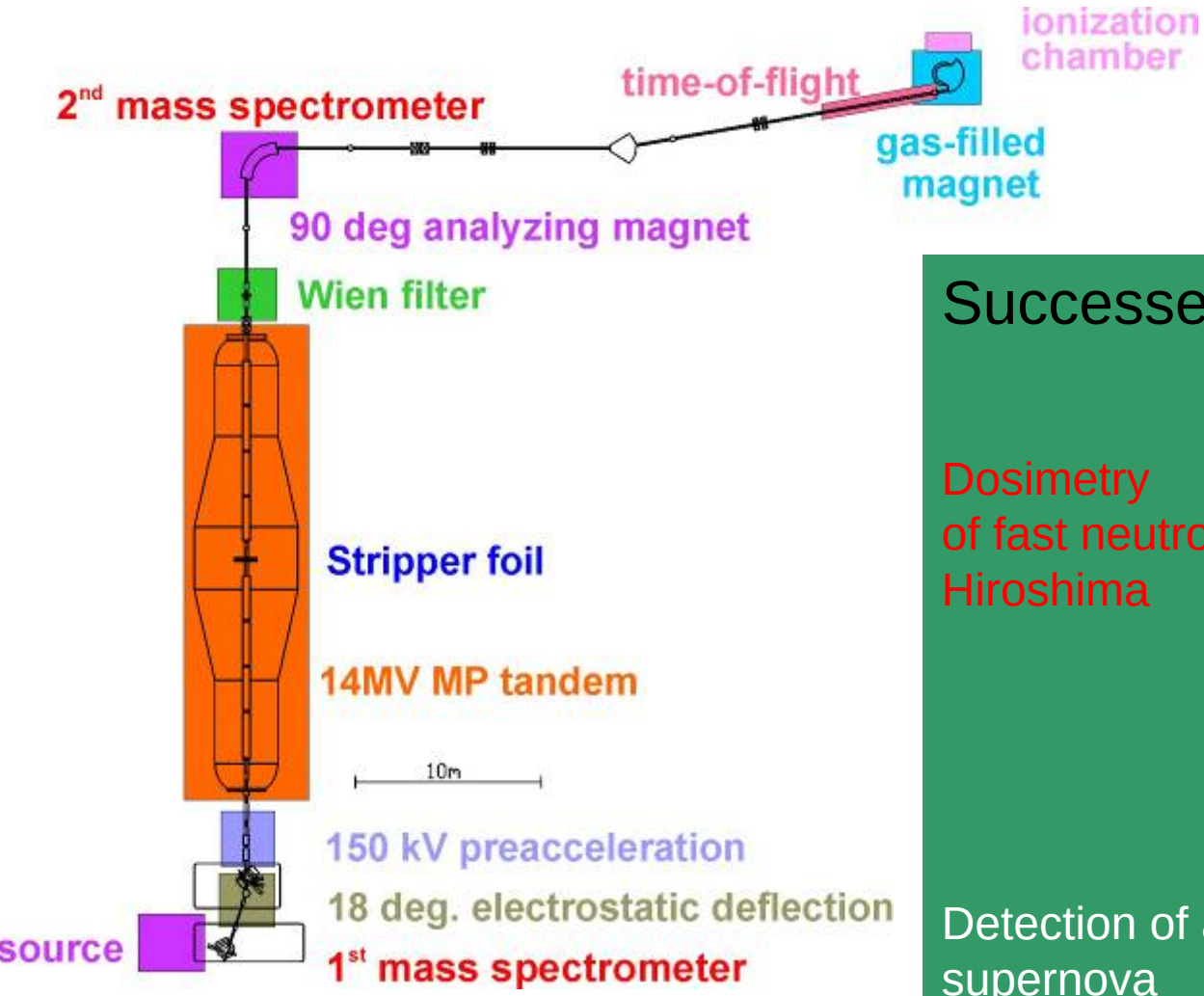
SPIRIT represents an Integrated Infrastructure Initiative funded by the European Commission.

SPIRIT integrates 11 leading ion beam facilities from 6 European Member States and 2 Associated States.

7 partners provide TransNational Access to their facilities. Ions are supplied in an energy range from below 10 keV to more than 100 MeV for modification and analysis of solid surfaces, interfaces, thin films, and soft matter, in particular on the nanometer scale.

AMS Setup

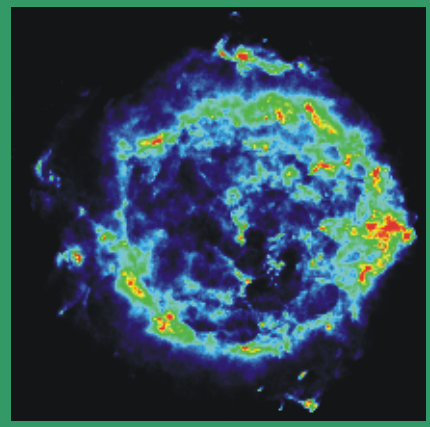
ultrasensitive detection of isotopes up to 1 : 10 000 trillions (10^{-16})



Successes:

Dosimetry
of fast neutrons
Hiroshima

Detection of a
supernova
2-3 Mio. years ago

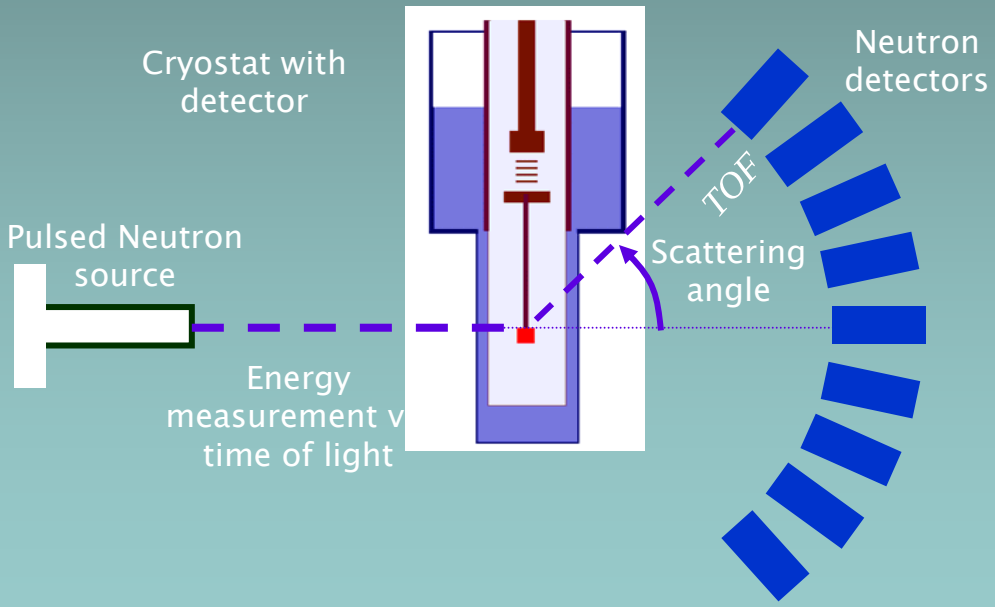


GAMS

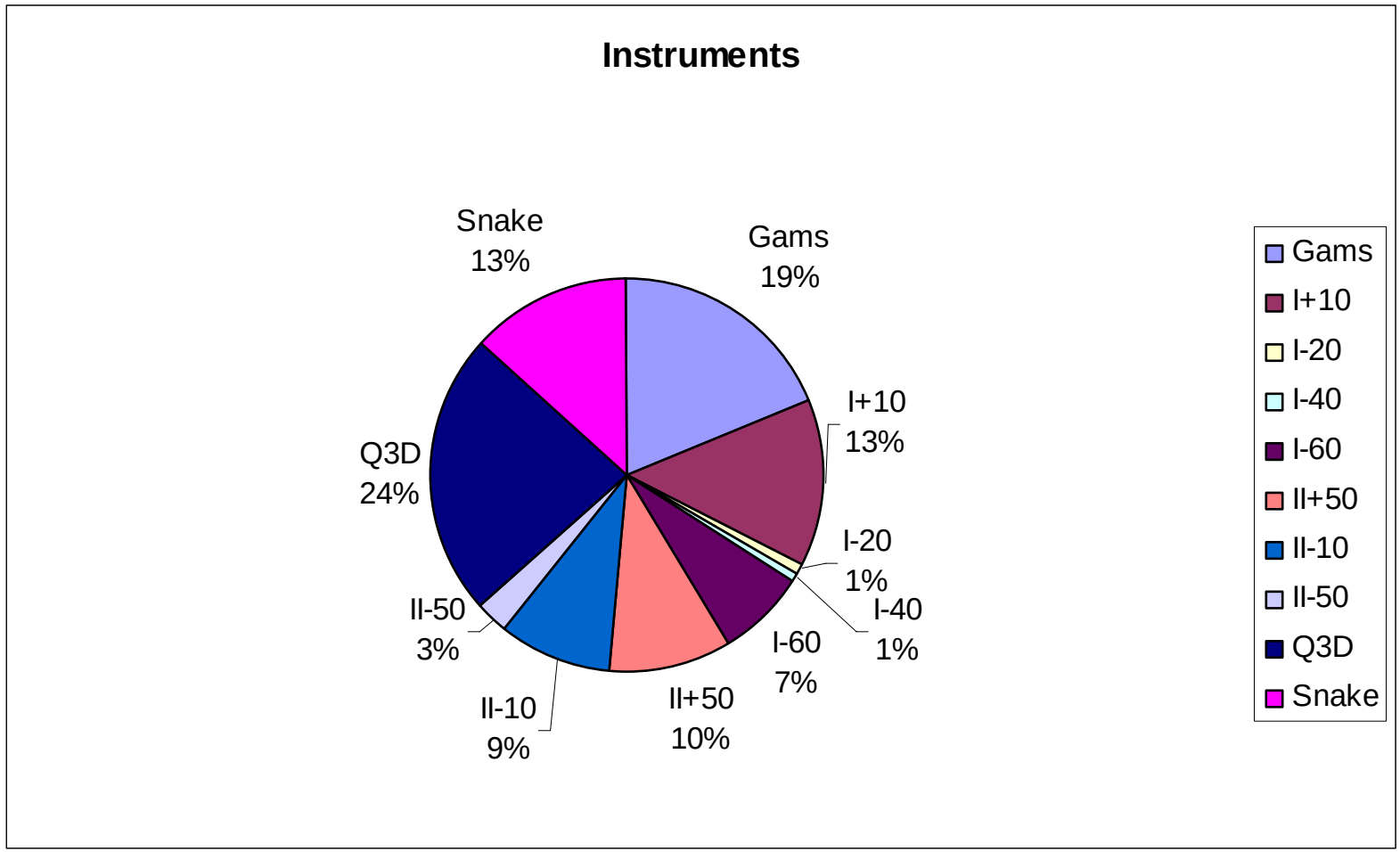
Detection of Dark Matter

- Development of cryo-detectors for the detection of dark matter candidates (WIMPs)
- Installation of a KELVINOX400 $^3He/^4He$ cryostate at MLL
- Test with neutrons hitting a $CaWO_4$ crystal at ~10mK

Experimental setup:



Instruments 2008



FINE