

Operational Experience at the S-DALINAC*,
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the status, the operational experience and the future
perspectives of the superconducting Darmstadt electron
linear accelerator (S-DALINAC) - one of the
pioneering superconducting electron accelerators - will
be presented. The S-DALINAC is an S-Band cw
recirculating machine with a maximum energy of
130 MeV. Acceleration of the 250 keV electron beam
from the gun and a preacceleration tube is achieved by
a $\beta = 0.85$, 2-cell capture section - followed by a $\beta = 1$,
5-cell and ten 20-cell cavities. Unloaded Q values of
all twelve superconducting Niobium cavities presently
range from $8 \cdot 10^8$ to $2 \cdot 10^9$, while all gradients exceed
5 MV/m, some cavities reach 10 MV/m. Besides being
an R&D project itself the S-DALINAC has produced
since commissioning some 11000 hours of beam time
for an ambitious experimental program in nuclear and
radiation physics. Electron beams variable in energy
from 3 to 120 MeV with currents up to 60 μ A, an
energy spread of $\pm 2.5 \cdot 10^{-4}$ and an emittance of $\epsilon_n = 2\pi$
mm mrad are employed routinely. Lately, numerous
new beam diagnostics stations have been installed
using transition radiation to determine the transverse
and longitudinal beam parameters. Recently, the
electron bunch length was determined as 4 ps with a
charge of 4 pC per bunch at 10 MHz repetition rate.
The S-DALINAC is also the driver of a Free Electron
Laser (FEL) in the near IR. After spontaneous
emission has already been observed the demonstration
of stimulated emission is soon expected.

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