Introduction to ESS

Workshop on Non-Linear Beam Expander Systems in High-Power Accelerator Facilities

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EUROPEAN SPALLATION SOURCE



ESS, MAX IV and Medicon Village





Multi-Science with Neutrons

Materials science Energy Technology

Bio-technology Hardware for IT

Nano science Engineering science







- Neutrons can provide unique and information on almost all materials.
- Information on both structure and dynamics simulaneously. "Where are the atoms and what are they doing?"
- 5000 users in Europe today Access based on peer review.
- Science with neutrons is limited by the intensity of today's sources



Neutrons See the Nuclei...





High Time-Average and Peak Flux





International Collaboration

Sweden, Denmark and Norway covers 50% of cost



The remaining ESS members states together with EIB covers the rest



17 Partners today



Based on European R&D



Ion source (Catania)



Radio-frequency quadrupole (Saclay)



Drift-tube linac (Legnaro)



SC single-spoke resonator (Orsay)



SC elliptical 5-cell cavity (Saclay)



High-Energy Beam Transport (Århus)



Construction Cost Estimates



Personnel:



Investment:





High-Level Linac Parameters





Linac Layout



	Length (m)	Input Energy (MeV)	Frequency (MHz)	Opt./Geom. Beta	No. of Modules	Temp. (K)
RFQ	5	0.075	352.2		1	≈ 300
DTL	19	3	352.2		3	≈ 300
Spokes	75	50	352.2	0.50	14 (2c)	≈ 2
Low Beta	117	191	704.4	0.70	16 (4c)	≈ 2
High Beta	200	653	704.4	0.92	15 (8c)	≈ 2
HEBT/Upgrade	163	2500				

Numbers are for Baseline 2011 "hybrid" version of SC linac. It is now superseeded by a design with segmented cryomodules, 80 MeV DTL, and other modifications.



Linac Hardware



IPHI RFQ



EURISOL triple-spoke cavity



SNS klystron gallery



Linac4 DTL





Beam Physics



- Lattice and optics exist for all sections of the linac, although not in final form.
- End-to-end simulations have been performed together with rudimentary error studies.
- A major challenge is to propagate a 5 MW beam without losing more than 1 W/m
- ...avoiding that the remaining >4.9995 MW drill a hole through the target!



End



Time Structure





HEBT, Warm Magnets

