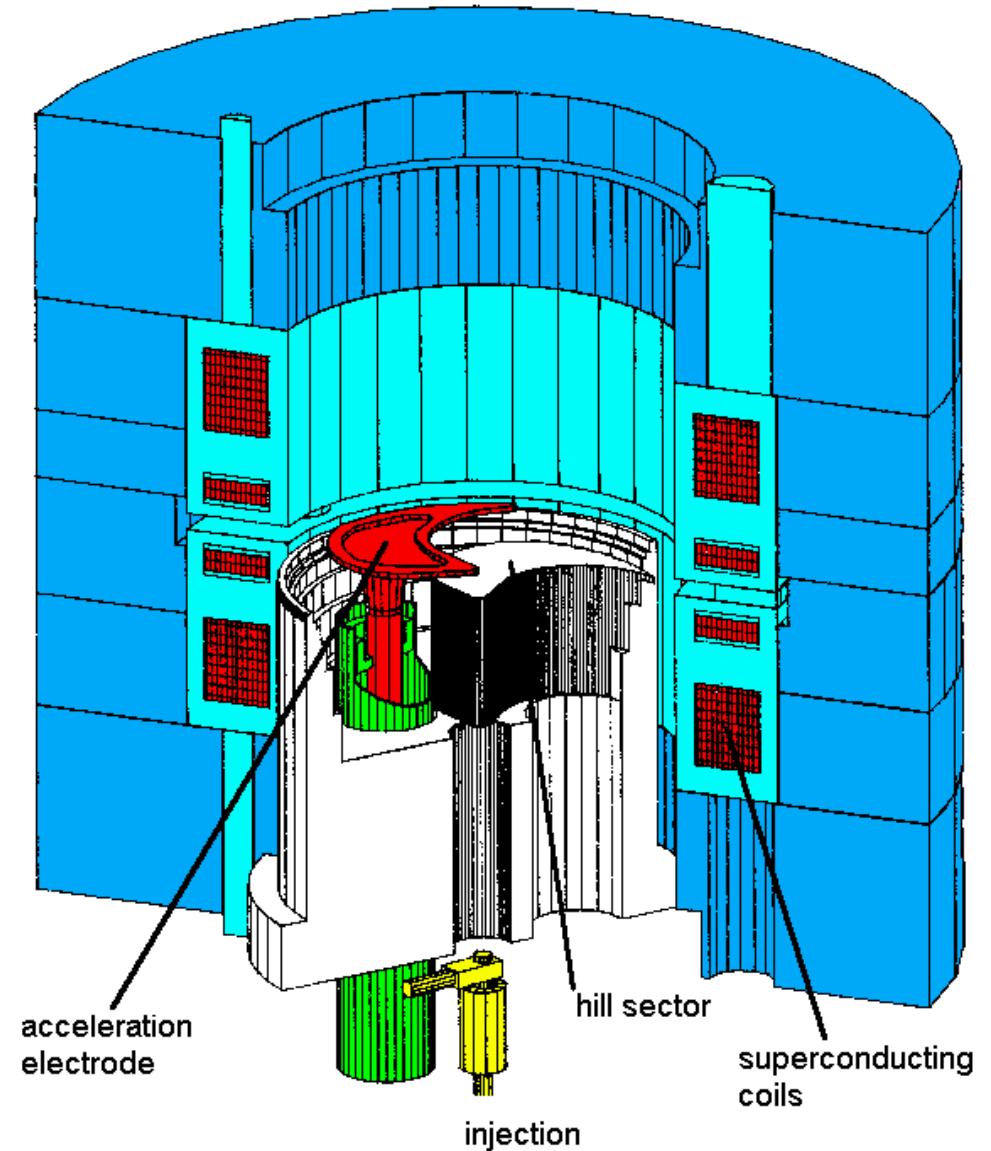
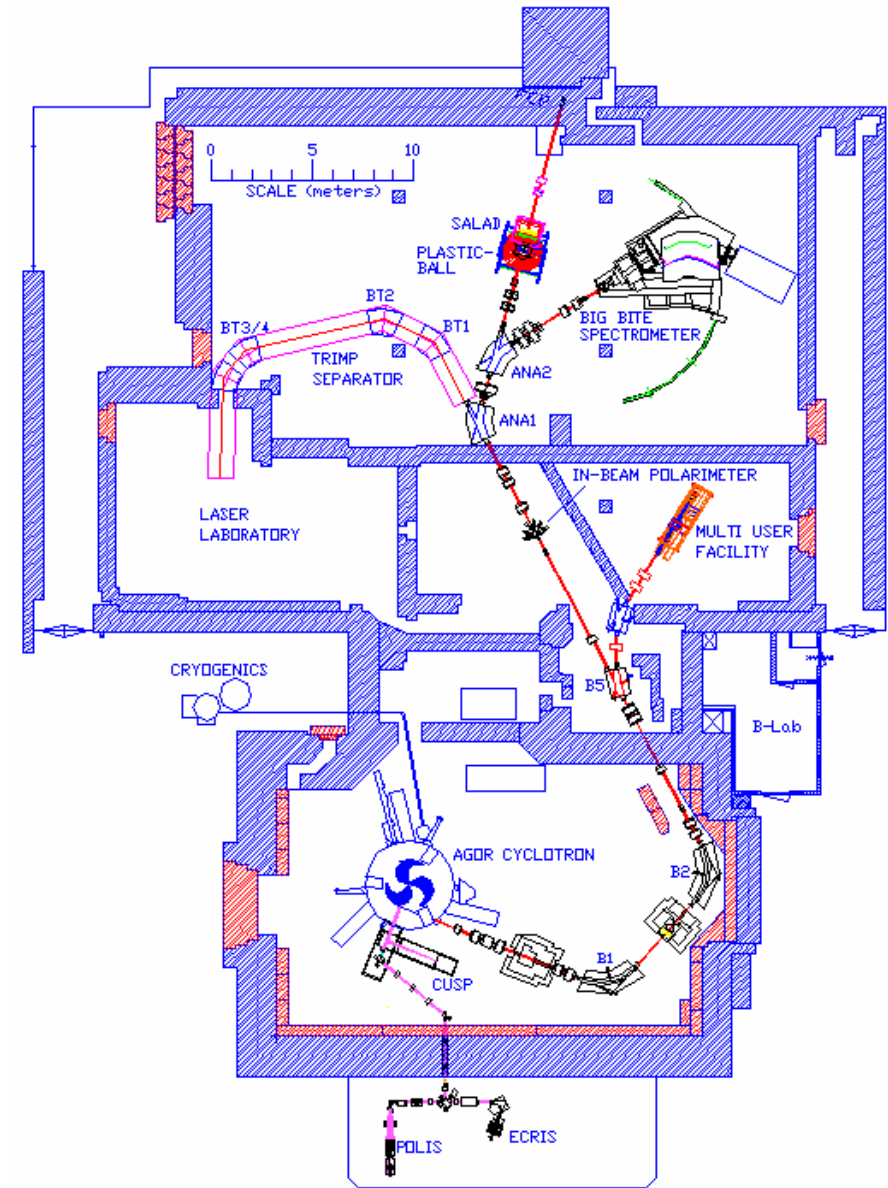


operation and development AGOR facility



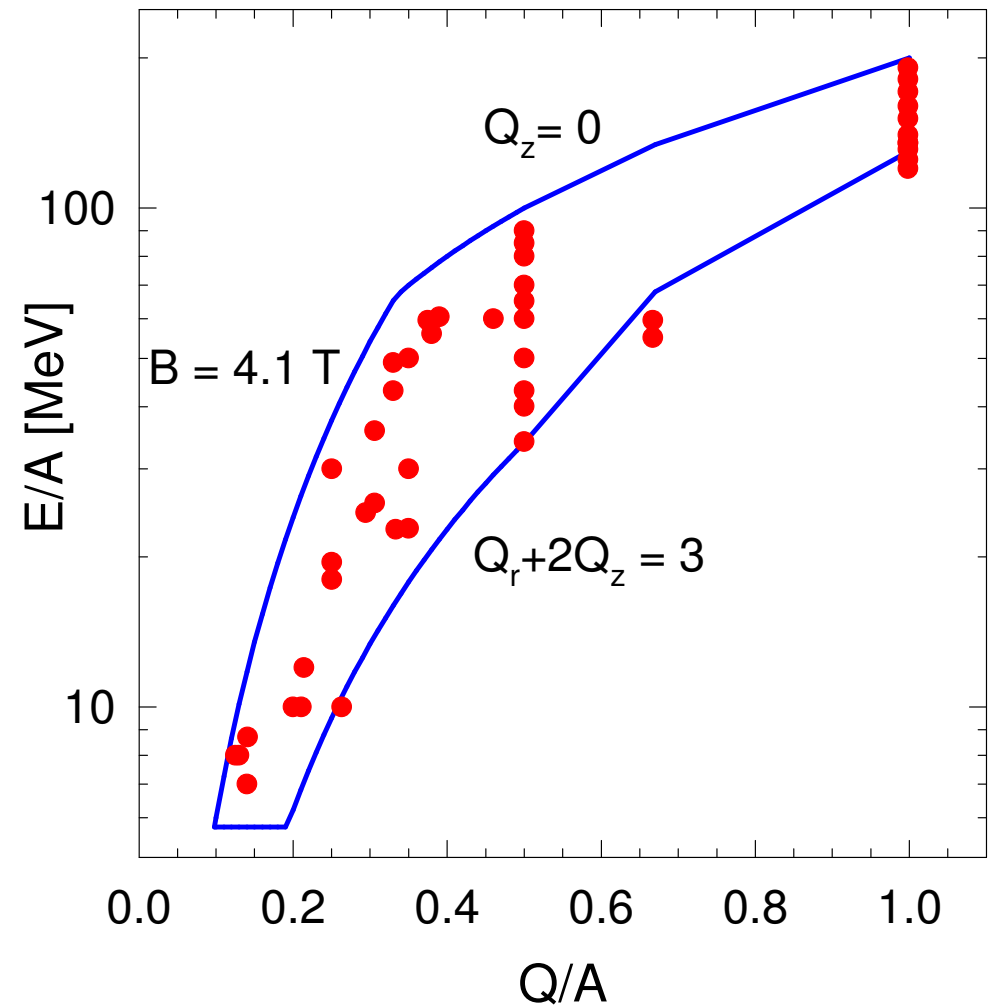
capabilities

- all elements: ^1H to ^{238}U
- polarized protons and deuterons
- experimental setups
 - Big Bite Spectrometer
 - BINA/SALAD
 - TRI μ P separator
 - irradiation setup



capabilities

- all elements: ^1H to ^{238}U
- polarized protons and deuterons
- protons $E = 120 - 190 \text{ MeV}$
- $Q/A = 0.5$ $E/A = 34 - 90 \text{ MeV}$
- heavy ions
 $(E/A)_{\min} = 5.5 \text{ MeV}$
 $(E/A)_{\max} = 600 (Q/A)^2 \text{ MeV}$



activities

- operation for experiments (3000 hours net/year)
 - nuclear physics
 - fundamental interactions
 - instrumentation
 - radiobiology
 - radiation hardness testing
- development to meet requirements future experiments
 - high intensity heavy ions
- research accelerator applications
 - space related
 - biomedical
 - material science



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high intensity heavy ion beams

- needed for experiments TRIμP-programme
- goal: 5×10^{12} pps for all beams up to Pb
- current operational status
 - $\geq 2 \times 10^{11}$ pps up to Ar
 - 10^{10} pps for Pb
 - ECRIS output main limitation
- stepwise approach
 - phase 1 (2005 - 2006) 2×10^{11} pps up to Pb
feasibility fully established
 - phase 2 (2007 - 2009) 5×10^{12} pps up to Pb (1kW)
feasibility to be established



phase 1

- upgrade ECRIS ionsource (completed august 2005)
 - based on AECR (LBL,USA)
 - collaboration JYFL, Finland and ANL, USA
 - goal: tenfold intensity increase
 - **output meets expectations**
- improvement beamline ionsource - cyclotron (2006)
 - goal: fourfold intensity increase

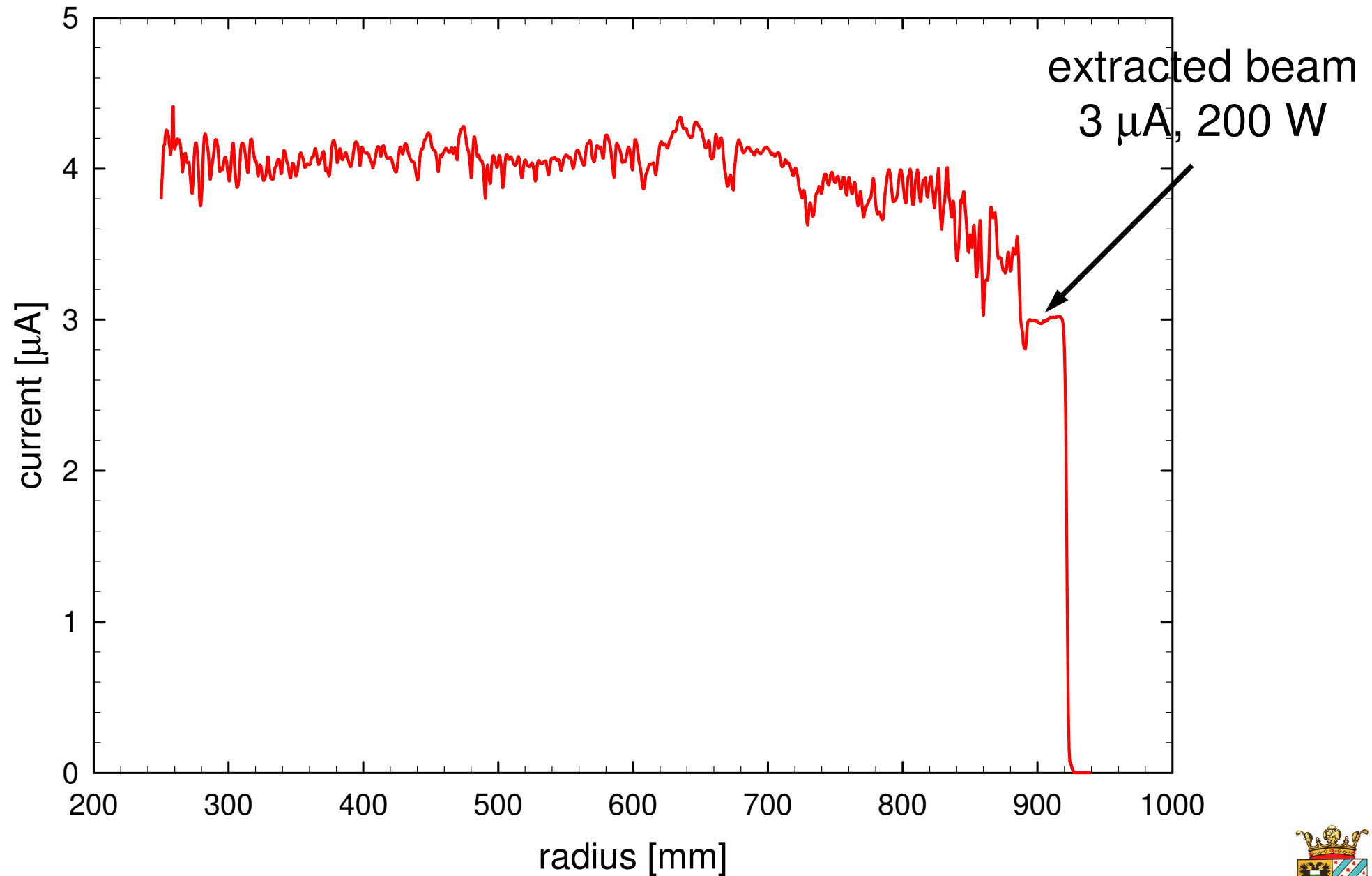


phase 1

- study fundamental limits beam intensity
 - injection: transverse space charge effects
 - acceleration: charge exchange residual gas
 - extraction: power dissipation electrostatic deflector
- present status
 - accelerated beam intensity up to 4.2 μA
injection efficiency independent of intensity
 - residual gas interaction strongly dependent on charge state
potential showstopper for specific ions
 - extracted beam power up to 200 W
extraction efficiency independent of intensity
ESD sufficient up to 100 W beam power if $\epsilon_{\text{ext}} \geq 75 \%$
 - within factor 10 from objectives phase 2
 - highest intensity not yet available for experiments

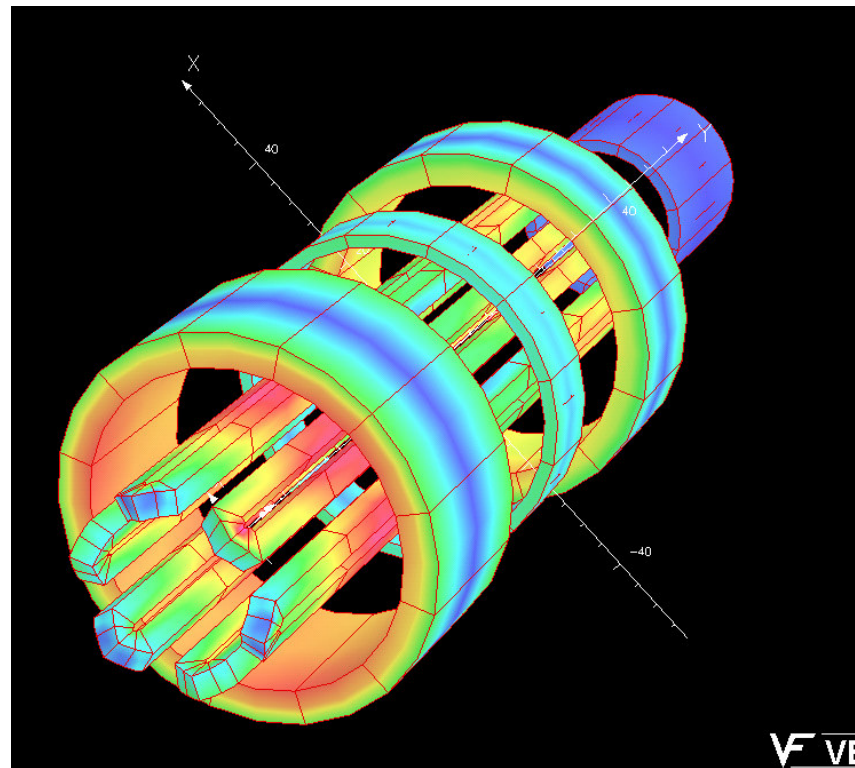


280 W $^{12}\text{C}^{4+}$ beam



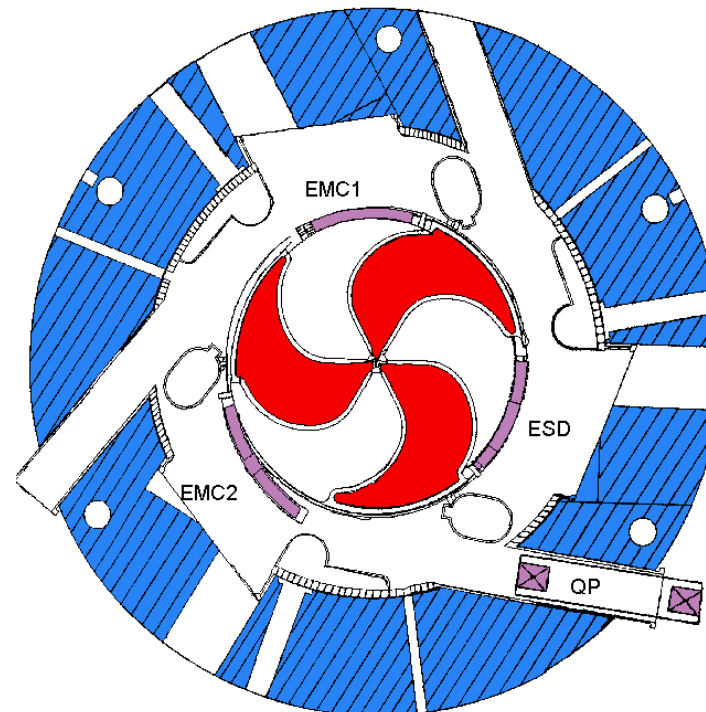
phase 2 (2007 - 2009)

- new ECRIS ionsource
 - European collaboration FP6 I3-EURONS development superconducting sources LNS, LPSC, GSI, GANIL, JYFL, CERN, ..., KVI



phase 2 (2007 - 2009)

- new ECRIS ionsource
 - European collaboration FP6 I3-EURONS development superconducting sources LNS, LPSC, GSI, GANIL, JYFL, CERN, ..., KVI
- improvement extraction channels
 - ESD: collaboration MSU-NSCL
 - EMC2, QP: industry contracts



phase 2 (2007 - 2009)

- new ECRIS ionsource
 - European collaboration FP6 I3-EURONS development superconducting sources LNS, LPSC, GSI, GANIL, JYFL, CERN, ..., KVI
- improvement extraction channels
 - collaboration MSU-NSCL; industry contracts
- power density up to 1 MW /cm^3
 - damage on ms-timescale
 - protect equipment against beamloss
 - European collaboration FP6 EURISOL-DS GANIL, LNL, GSI, JYFL, CERN, .., KVI



EURISOL

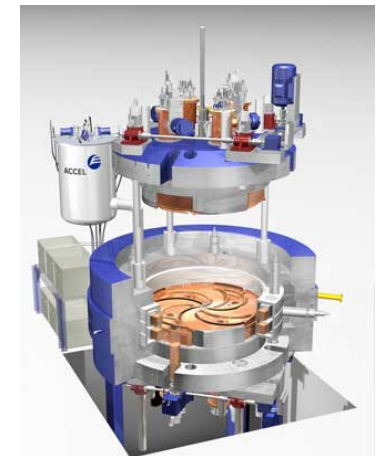


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biomedical research

- radiobiology: radiation tolerance healthy tissue relevant for clinical practice
- future plans
 - comparison proton \leftrightarrow heavy ion therapy
 - Bragg-peak RBE of protons
- instrumentation
 - protontherapy cyclotron
 - dose imaging
 - proton therapy delivery system



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space related research

- space research
 - detector tests for SolarOrbiter en BepiColombo first experiments with protons 2005
 - development charged particle telescope
 - four year contract under negotiation
- radiation hardness electronic components
 - EADS Bremen, TRAD Toulouse
 - first experiments with protons in 2005
- development heavy ion irradiations planned



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Operation at h=5 (15-Nov-2005)

- extend operations to h=5 mode
- lower energy possible:
 - h=4 $E_{\min}=5.8$ MeV/A
 - h=5 $E_{\min}=3.8$ MeV/A

