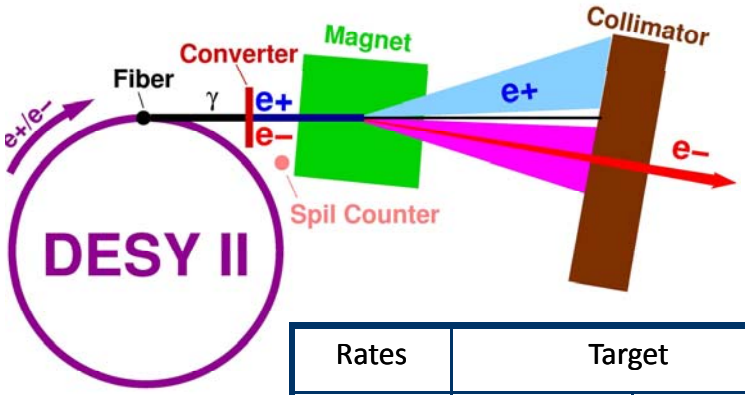
Survey of test beam and irradiation facilities present in RD51 institutes

DESY Test beam

- Three beam lines available
- Bremsstrahlungs/conversion beam with E_e up to 6 GeV.
- Test beam momentum steered by magnet current by user.
- Rates depending on beam line, energy, target material, collimator setting and operation.
- In practice is the maximal event rate around 2 kHz (3 GeV, 3mm Cu convert, Collimator ca. 5mm x 5mm)



Rates	Target	
Energy	3mm Cu	1mm Cu
1 GeV	~2.2 kHz	~ 0.5 kHz
2 GeV	~4.6 kHz	~1.1 kHz
3 GeV	~5.2 kHz	~1.3 kHz
4 GeV	~4.4 kHz	~1.1 kHz
5 GeV	~2.8 kHz	~0.5 kHz
6 GeV	~1.5 kHz	~0.2 kHz

- DESY test beam available most of the year interrupted by one maintenance week every 6 weeks (for 2009 not yet fixed)
- People can apply for test beam periods of up to three weeks
- Longer periods are negotiatable (depending on demand)

Facilities for Test Beam User

- All three test beam lines have
  - Interlock systems
  - Magnet control
  - Patch panels with preinstalled cables
  - Gas warning systems
  - Fast internet connection

- Support from DESY:
  - Translation stages
  - Premixed gases
  - Superconducting Magnet (1T) (EUDET)
  - Beam Telescopes:
    - MVD Telescope (σ<15µm)
    - EUDET Telescope (σ<10µm)

- You have to bring:
  - Your Data Acquisition incl. computers
  - In special cases: trigger scintillators

More information:

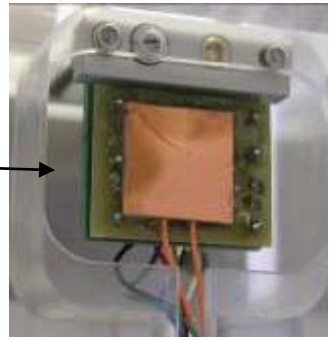
testbeam.desy.de

Please contact: testbeam-coor@desy.de

Testbeam coordinators:
Ingrid-Maria Gregor
Norbert Meyners

Nikhef irradiation facility

- Using ^{90}Sr source 5 GBq
  - 1 – 2 MeV electrons (mips)
- Set-up in H038a operational
  - 2 channel gas flow control
  - 2 channel remote controlled HV
  - Remote controlled irradiation stage
    - Moving in or out
  - DAQ hardware and software (Labview) operating



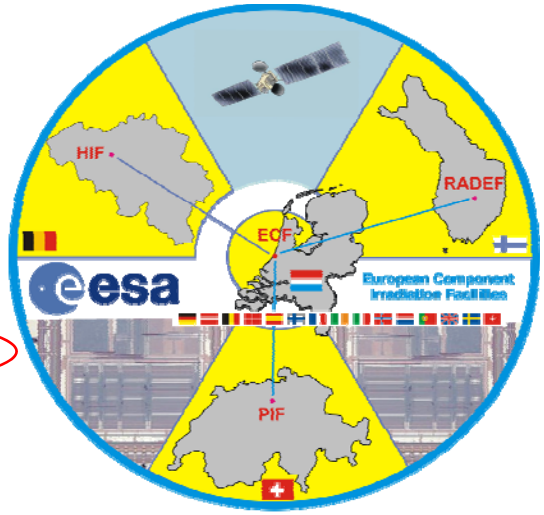
DAQ interface

Radiation effects facility, RADEF

UNIVERSITY OF JYVÄSKYLÄ

Official test laboratory of ESA since 2005

ESTEC/Contract No. 18197/04/NL/CP
”Utilisation of the High Energy Heavy Ion Test Facility for Component Radiation Studies”



- ESA beam times allocated upon request
- Non-ESA beam times on commercial basis or via proposals

22 users from 10 countries, e.g.

- **Alter Technology Group, Spain & France**
- **CEA, Comité Européen des Assurances, Bruyere-le-Chatel, France**
- **CNES, Service Environnement Spatial et Composants Nouveaux, Toulouse, France**
- **EADS Space Transportation Co., Bremen, Germany**
- **IDA, Institut für Datentechnik und Kommunikationsnetze, Braunschweig, Germany**
- **INTA, Instituto Nacional de Tecnica Aeroespacial, Madrid, Spain**
- **JAXA, Japan Aerospace Exploration Agency, Japan**
- **ONERA, Office National d'Etudes et de Recherches Aérospatiales, Toulouse, France**
- **Saab Ericsson Space Co., Gothenburg, Sweden**
- **Sandia National Laboratories, Albuquerque, USA**
- **Swedish Space Corporation, Stockholm, Sweden**
- **Thales Alenia Space Co., Toulouse, France**

Radiation effects facility, RADEF

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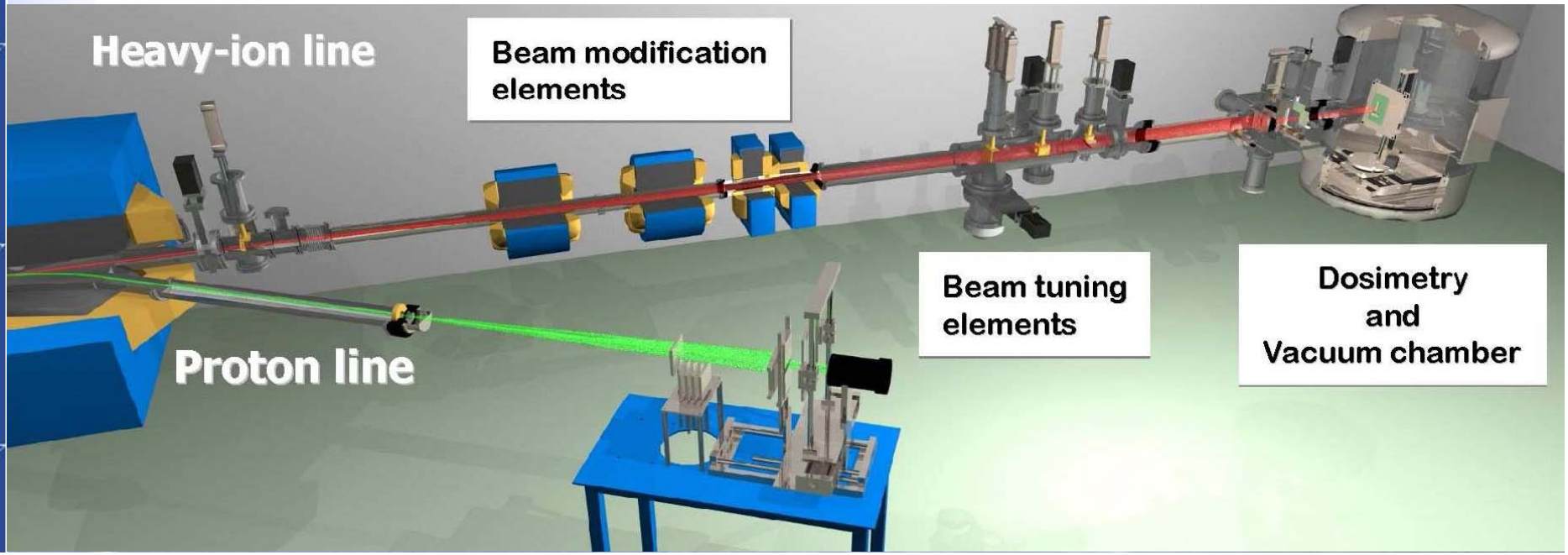
Heavy-ion line

- Cocktail species N, Ne, Si, Ar, Fe, Kr, Xe
- Energy 9.3 MeV/u, i.e. 1.2 GeV for Xe
- LET from 6 to 69 MeV/(mg/cm^2) and range 90 to 200 µm in silicon
- Irradiations both in vacuum and in air

Proton line

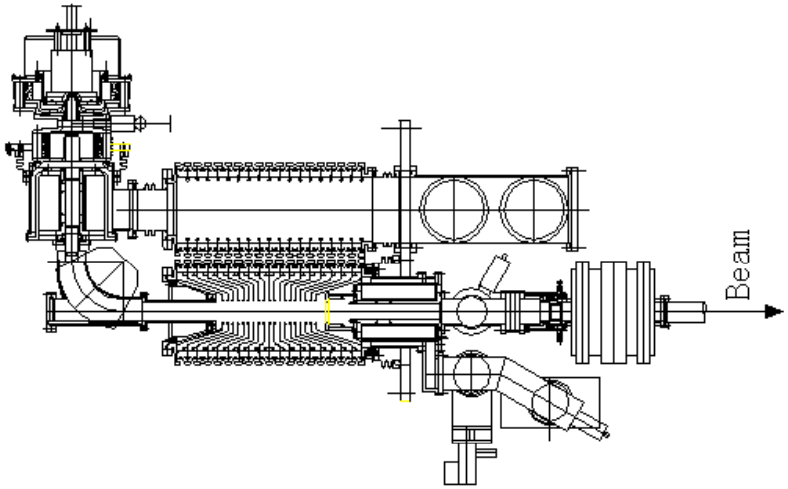
- Energies from few MeV to 60 MeV, adjusted by the degraders
- Irradiations in air



14MeV Neutron Generator

at School of Nuclear Science and Technology, Lanzhou University, Lanzhou, P.R.China

- Specification (See the right diagram)
  - Intensity of beam: <6X10e12 n/S
  - Diameter of Beam: <2cm
  - Diameter of T(H3) Target: 33cm
  - Lifetime of T(H3) Target: >150hours
- Access procedure
  - Submit the application at least one year before. Only available for unmilitary application.
- Present status
  - Reconstruct the experiment hall(450m2), the total area of neutron lab is 2700m2. (See the right 3D figure.)
  - Add two new beam lines. (See the right floor plan)

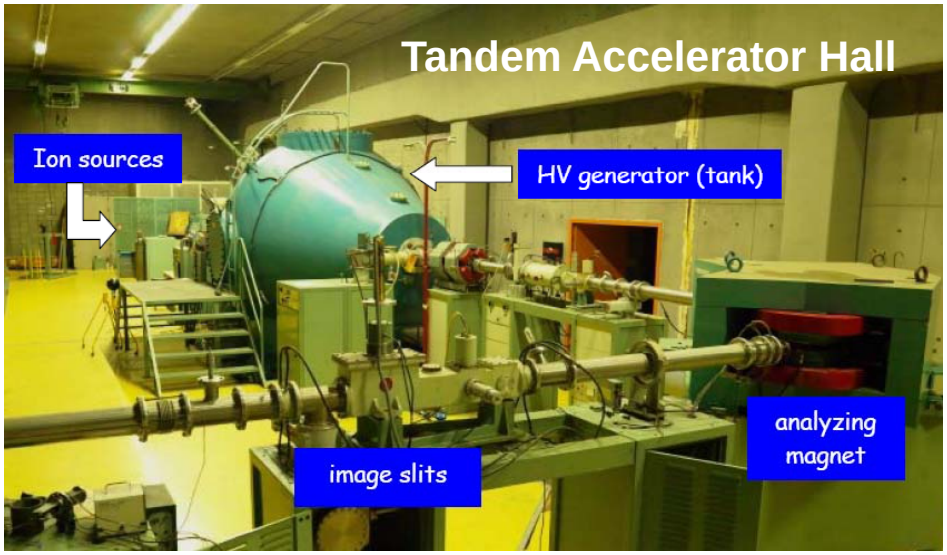


The 5MV Tandem Accelerator of Demokritos

Typical beam intensities

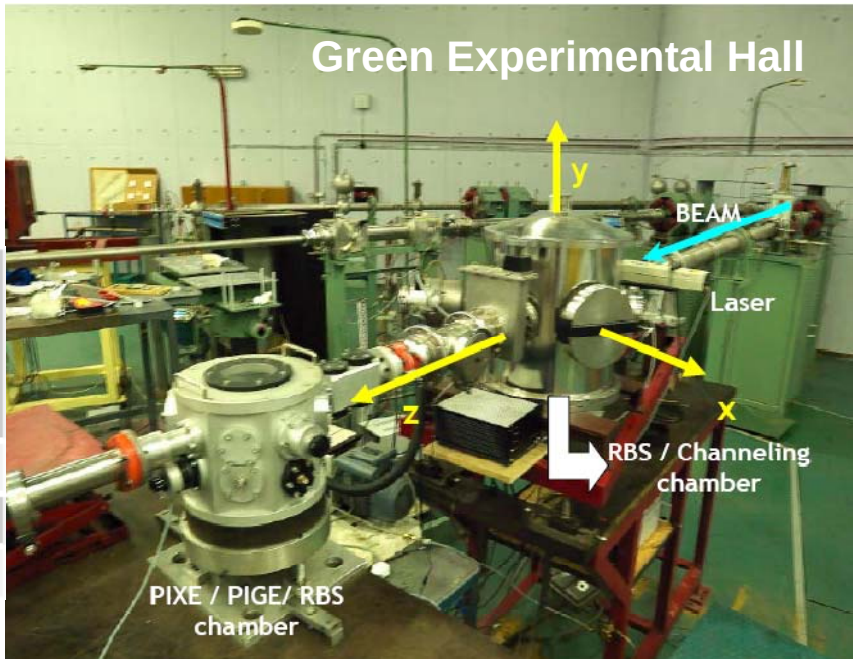
Ion	Beam current after the analyzing magnet (on target)
p	10 μA
d	5 μA
^{4}He	0.1 μA
Li	0.2 μA
C	0.2 μA
O	0.3 μA

flux corresponding to 1μA ~ 7*10^{13} p/cm^2/sec



Neutron beams

Nuclear reaction	Energy range of the p/d beam (MeV)	Energy range of the secondary neutron beam (MeV)	Typical n-fluxes (n sec^{-1} cm^{-2})
^{7}Li(p,n)^{7}Be	1.9 - 2.4	0.12 - 0.65	≈ 10^5
d(d,n)^{3}He	0.8 - 9.6	3.9 - 11.5	≈ 10^6
t(d,n)^{4}He	0.8 - 8.4	16.4 - 25.7	≈ 10^5



Montreal

Concerning Montreal (Particle Physics group) we have access to a van der Graff tandem delivering protons (maximum energy 11 MeV) and neutrons of low energy (from several MeV down to 10 keV or so). The tandem is also delivering ions (for instance 30 MeV carbons, 35 MeV oxygens and other ions). We have also access to sources. In addition to detector testing, irradiation measurements have been also performed with the tandem (for protons 7 - 11 MeV fluence 10^{13} - 10^{14} p/cm^2).

Novosibirsk

Regarding the irradiation facilities at the Budker Institute, we can provide the following information:

1) Tagged photon beam (available):
energy 20 MeV - 1.5 GeV;
energy resolution 1% at 1 GeV.

2) Test electron beam (in preparation):
energy up to 1.5 GeV.

3) Synchrotron radiation beam (available).

Access procedure for RD51 members: just apply and come to Novosibirsk.