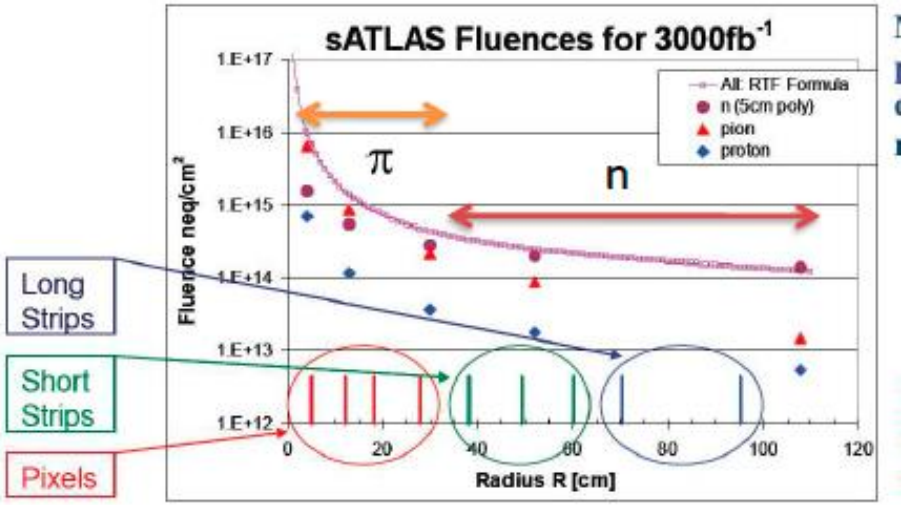
Transnational access to TRIGA _Mark III reactor

at Jožef Stefan Institute, Ljubljana

Why reactor?

- neutrons cause damage also in HEP experiments!



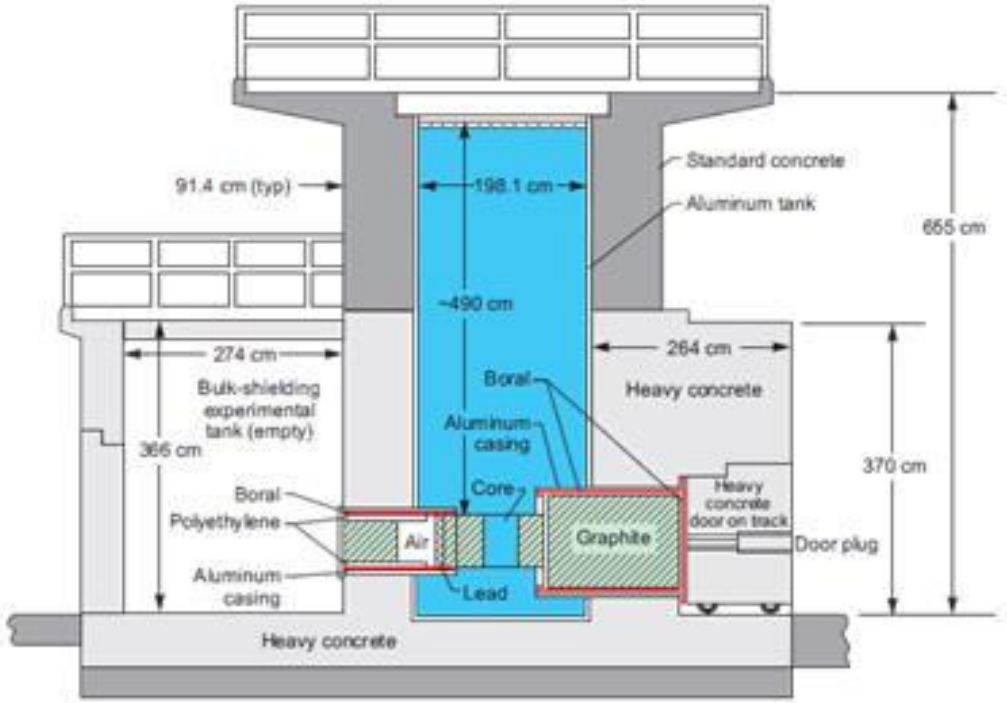
- NIEL concept is not valid!
- high fluences possible at reactor

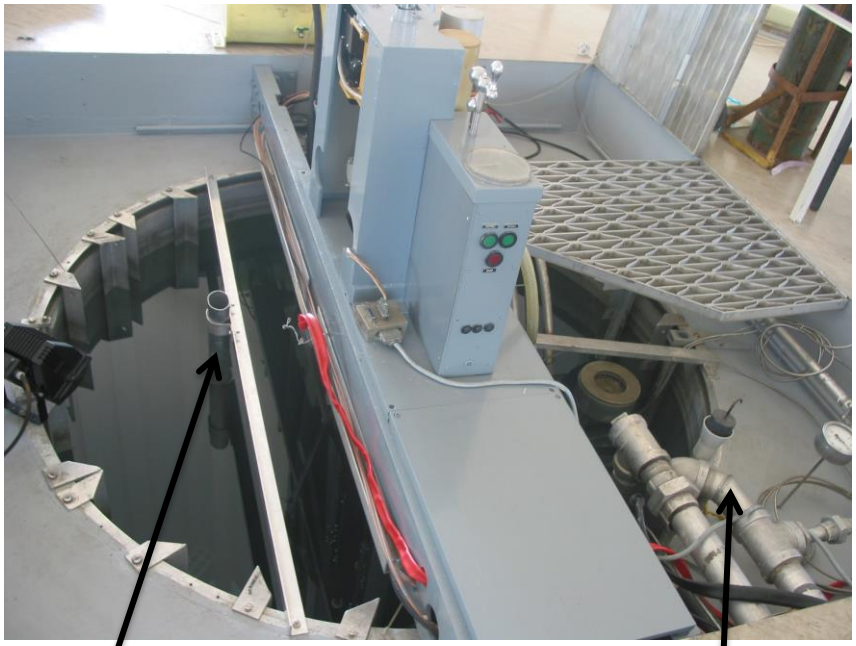
TRIGA reactor

Training **R**esearch **I**sotope **G**eneral **A**tomics

- Built in 1966 (General Atomics), reconstructed in 1991
- 250 kW maximum power, can be regulated to few W
- flux scales with power
- agreement between simulated and measured fluxes within few percents
- measured damage factor for fast (> 0.1 MeV) neutrons is 0.90 ± 0.05
- calculated damage factor is 0.88 ± 0.05
- there are also epithermal and thermal neutrons (2-3 x flux of fast neutrons), contribution to NIEL only 1-2%
- TID is about 1 kGray for 10^{14} $n_{eq}cm^{-2}$ at 250 kW
- equivalent flux is 1.69 10^{12} $ncm^{-2}s^{-1}$ in small tube (10^{16} in 100 min)
- equivalent flux flux is 3.05 10^{12} $ncm^{-2}s^{-1}$ in large tube
- accuracy of equivalent fluence is ± 10%
- maximum uninterrupted irradiation time is 16h.
- highest fluence for AIDA 10^{17} cm^{-2}
- web page http://www-f9.ijs.si/~mandic/ReacSetup.html

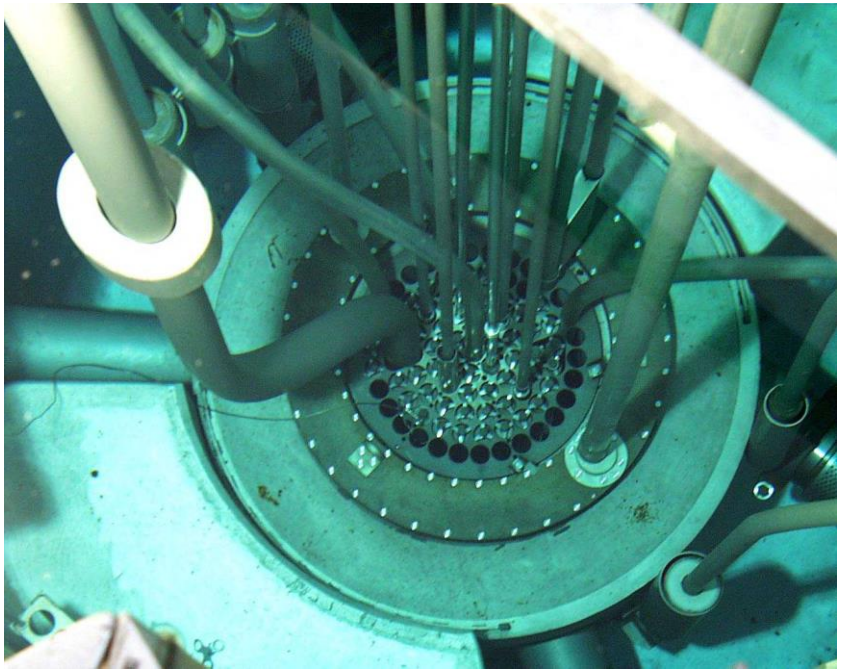
The reactor research centre is a part of Jožef Stefan Institute,

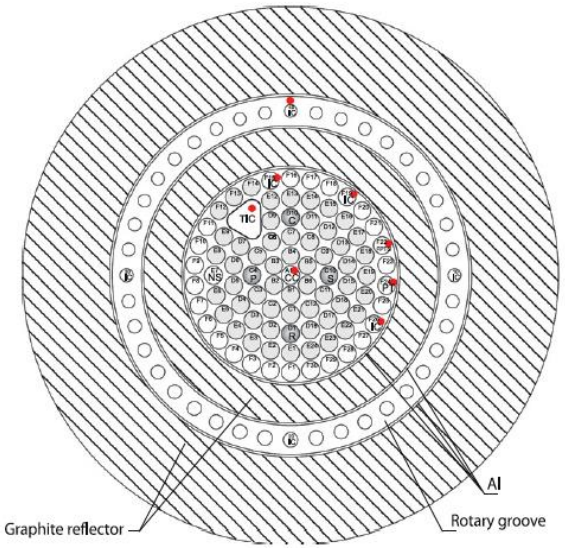


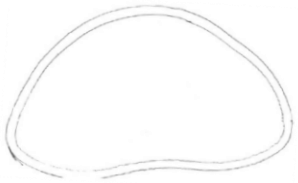


Large tube

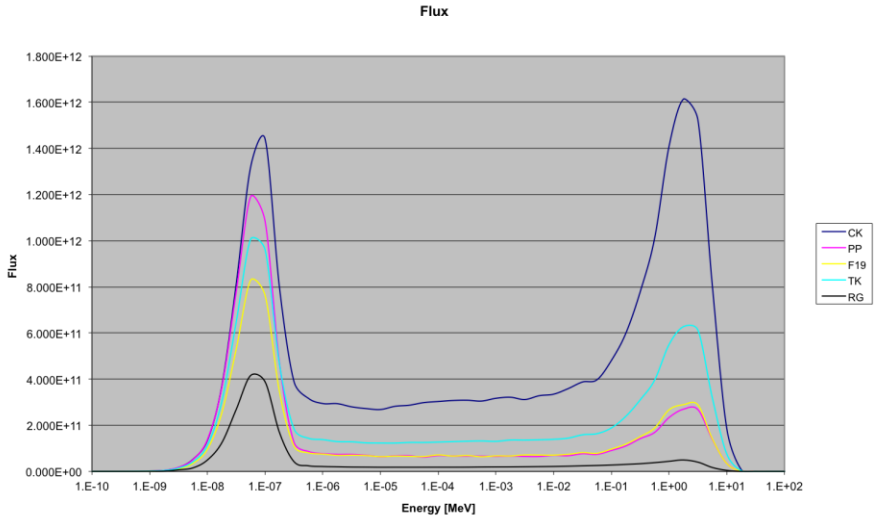
Small tube







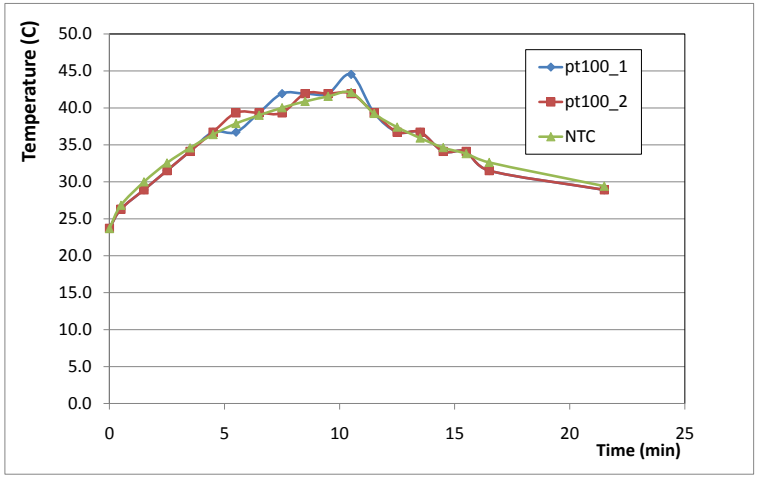
elliptic large tube (axis 7 x 5cm)



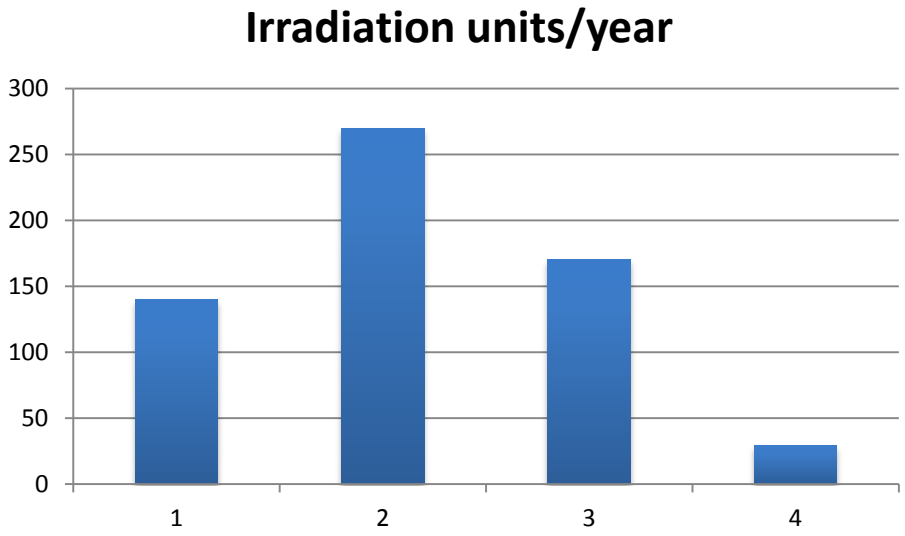
- flux per unit of lethargy (➔ln E)

L. Snoj et al. Applied Radiaton and Isotopes 70 (2012) 483-488

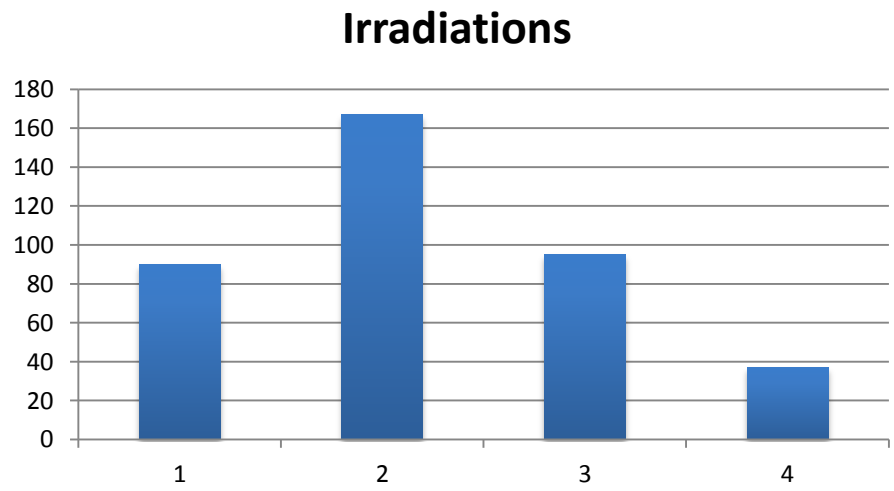
Temperature during irradiation:



- no cooling of samples during irradiation
- water temperature stabilized to 20±2^{o}C
- annealing times long compared to irradiation time

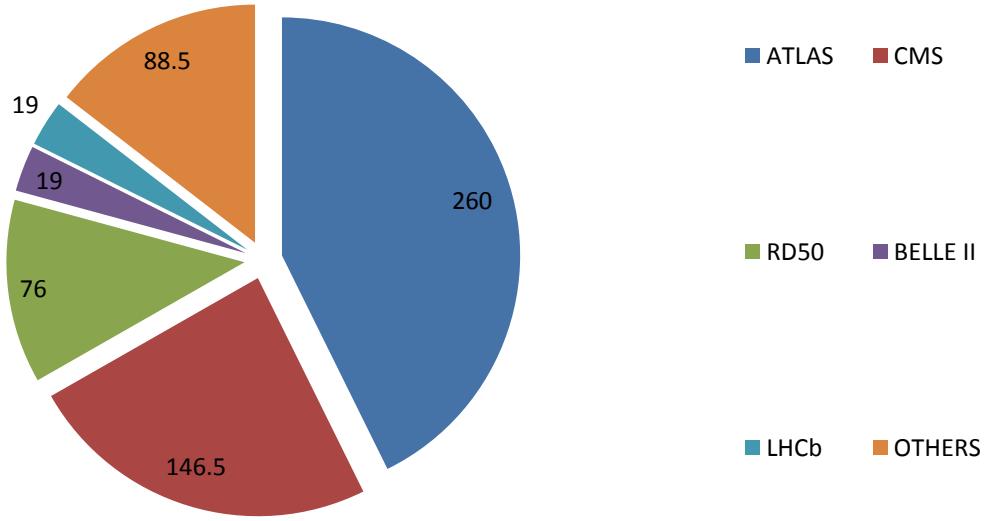


600 units delivered



389 irradiations

Sharing of reactor units between experiments



More than 30 publications related with AIDA irradiations at JSI published before March 2014

Conclusion:

- reactor proved to be useful tool to study of radiation damage
- plan for irradiations was 100% fulfilled