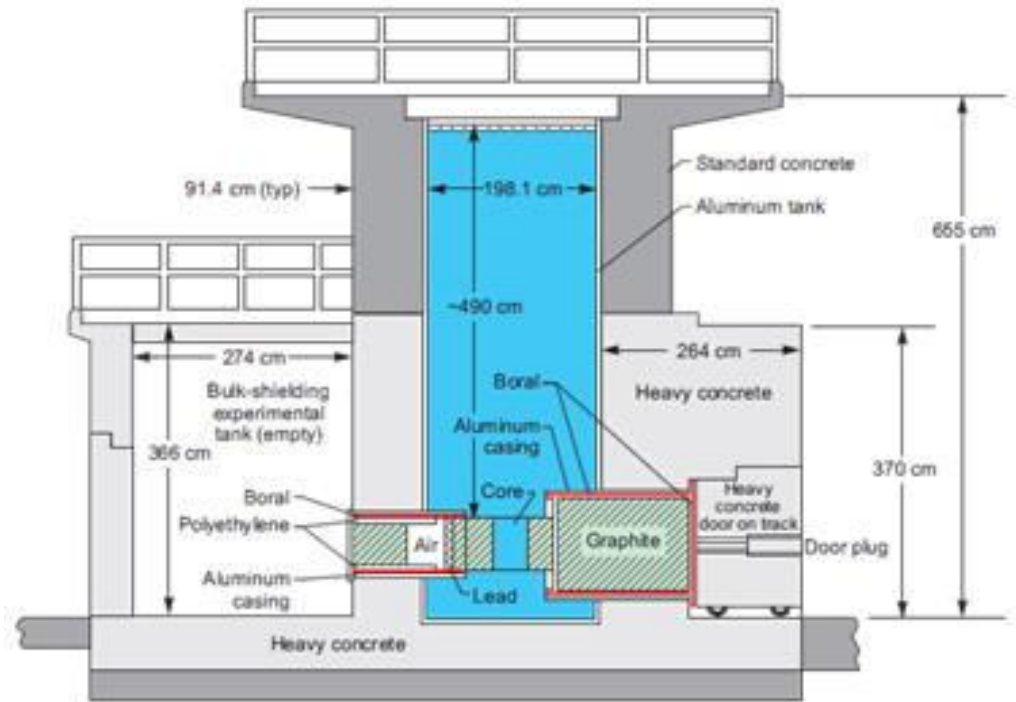


# Transnational access to TRIGA MarkII reactor at Jožef Stefan Institute, Ljubljana, Slovenia WP 11.2

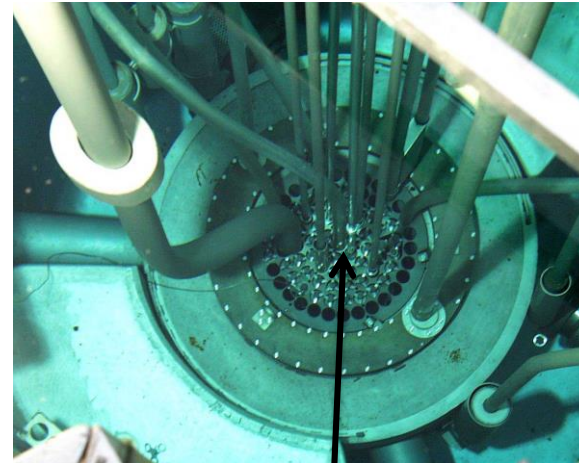
The reactor research centre is a part of Jožef Stefan Institute,



# TRIGA Mark II reactor

## Trainig Research Isotope General Atomics

- 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 in reactor core within few percents
- measured damage factor for fast ( $> 0.1$  MeV) neutrons is  $0.90 \pm 0.05$
- calculated damage factor is  $0.88 \pm 0.05$
- 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  $1.69 \cdot 10^{12} ncm^{-2}s^{-1}$  in small tube ( $10^{16}$  in 100 min)
- equivalent flux flux is  $3.05 \cdot 10^{12} ncm^{-2}s^{-1}$  in large tube
- accuracy of equivalent fluence is  $\pm 10\%$
- maximum uninterrupted irradiation time is 16h.
- highest fluence for AIDA  $10^{17} cm^{-2}$
- web page <http://www-f9.ijs.si/~mandic/ReacSetup.html>



Small tube

$$\Phi_{\max} = 1.54 \cdot 10^{12} n_{\text{eq}} \text{cm}^{-2}$$

$$10^{16} n_{\text{eq}} \text{cm}^{-2} \text{ in } 6500 \text{ s}$$

Accuracy about 10%

Large tube

$$\Phi_{\max} = 3.57 \cdot 10^{12} n_{\text{eq}} \text{cm}^{-2}$$

**New:**

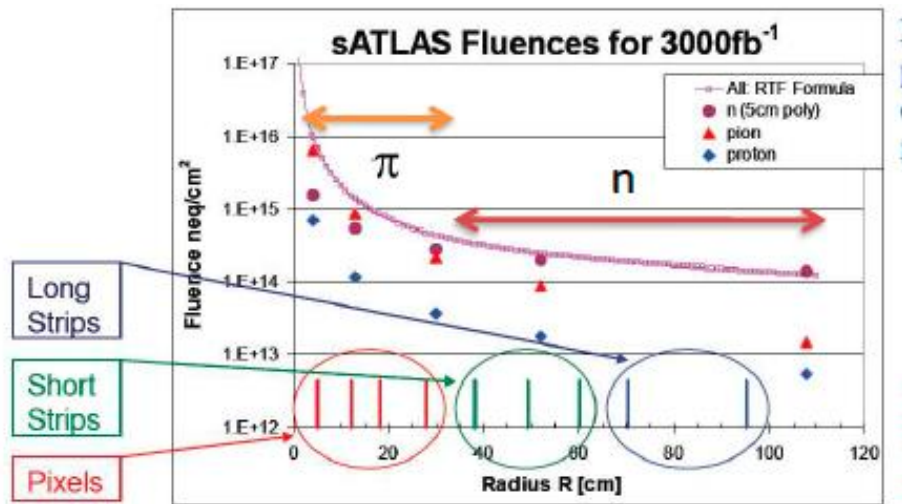
Central tube

$$\Phi_{\max} = 6 \cdot 10^{12} n_{\text{eq}} \text{cm}^{-2}$$

Preliminary....

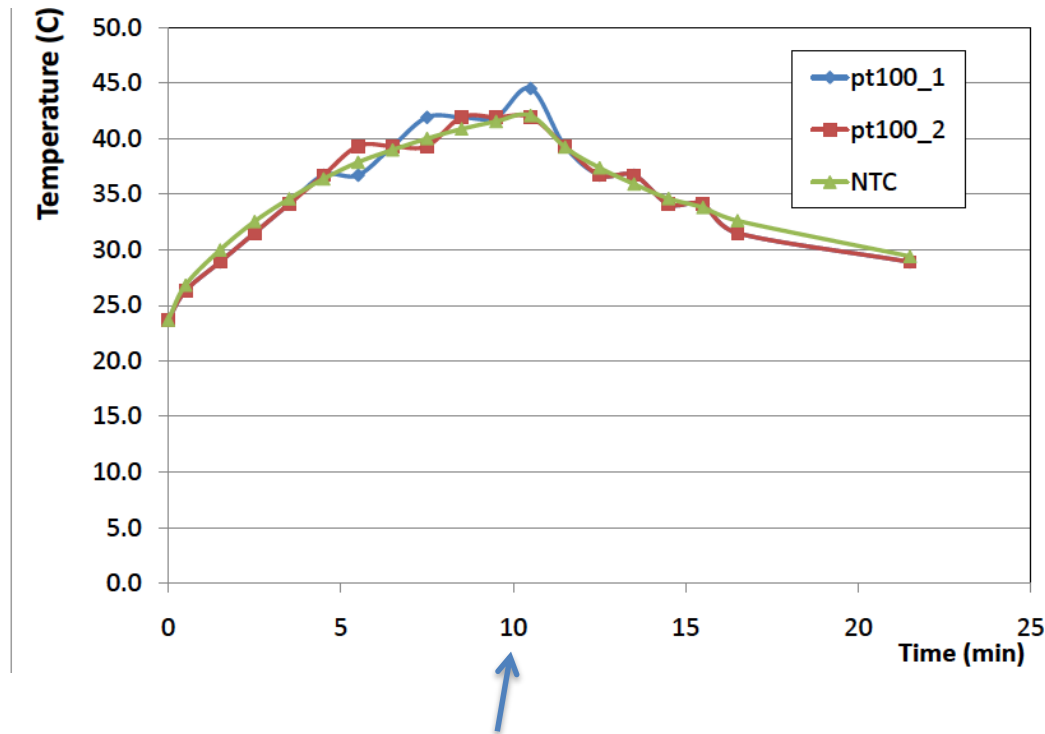
# Why reactor?

- neutrons cause damage also in HEP experiments!



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

# Temperature during irradiation (small channel)



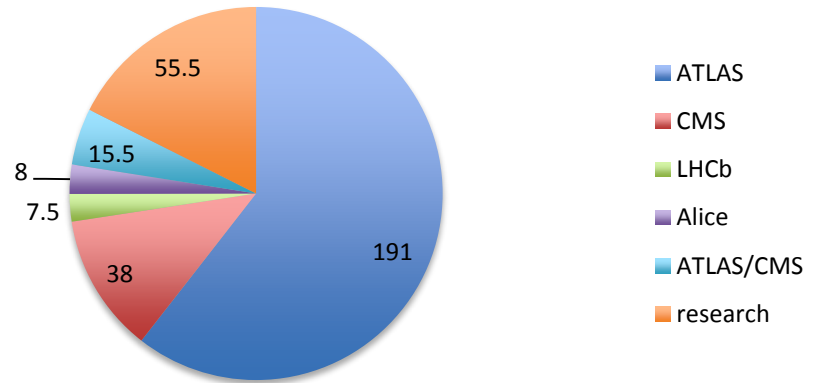
$10^{15} \text{ ncm}^{-2}$  in small channel

“standard” annealing procedure after irradiation – 80 min at 60°C – minimizes uncertainties due to annealing during the irradiation ( $N_{\text{eff}}$ )

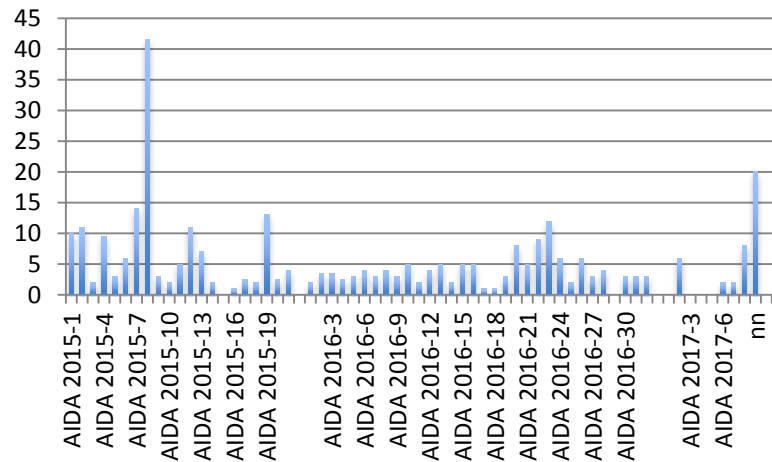
# Sharing of units between experiments:

315.5 units delivered in 61 projects  
 500 units foreseen in total  
 7 publications in P1

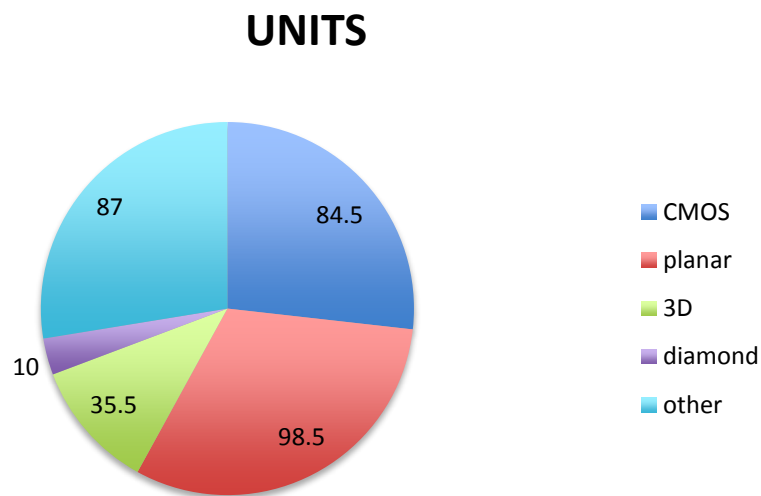
**UNITS**



**UNITS**

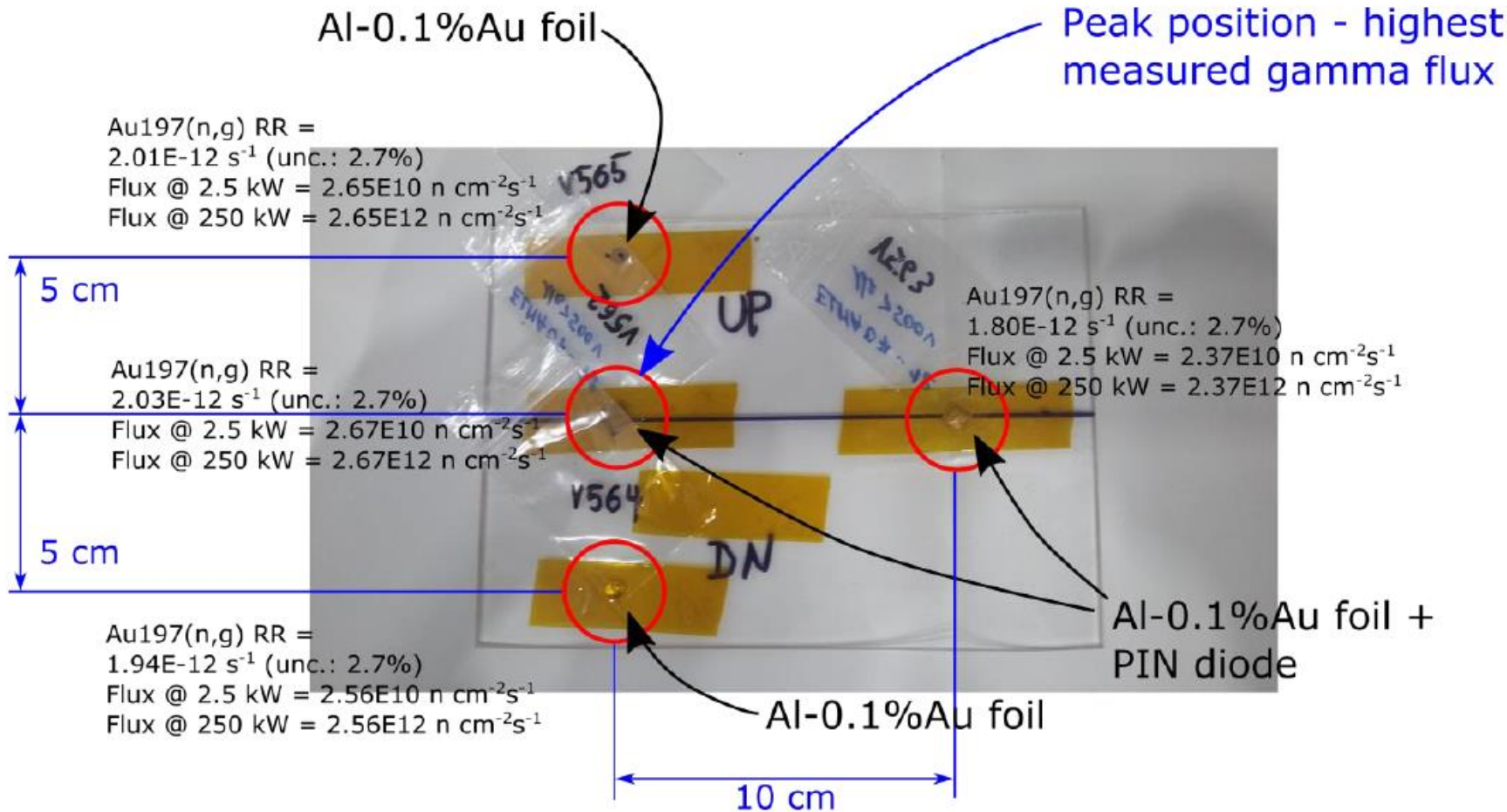


# Research topics:





# Irradiation channel for large objects (WP15.5)



NIEL Flux  $3.9 \times 10^{11} \text{ ncm}^{-2}$ , hardness factor 0.83 (0.146 for total flux)  
 in small channel  $1.54 \times 10^{12}$  HF 0.90  
 250 s  $\rightarrow 10^{14} \text{ ncm}^{-2}$

# Conclusion:

- JSI reactor continued to be widely used for radiation damage studies
- about 60 % of plan fulfilled in two years