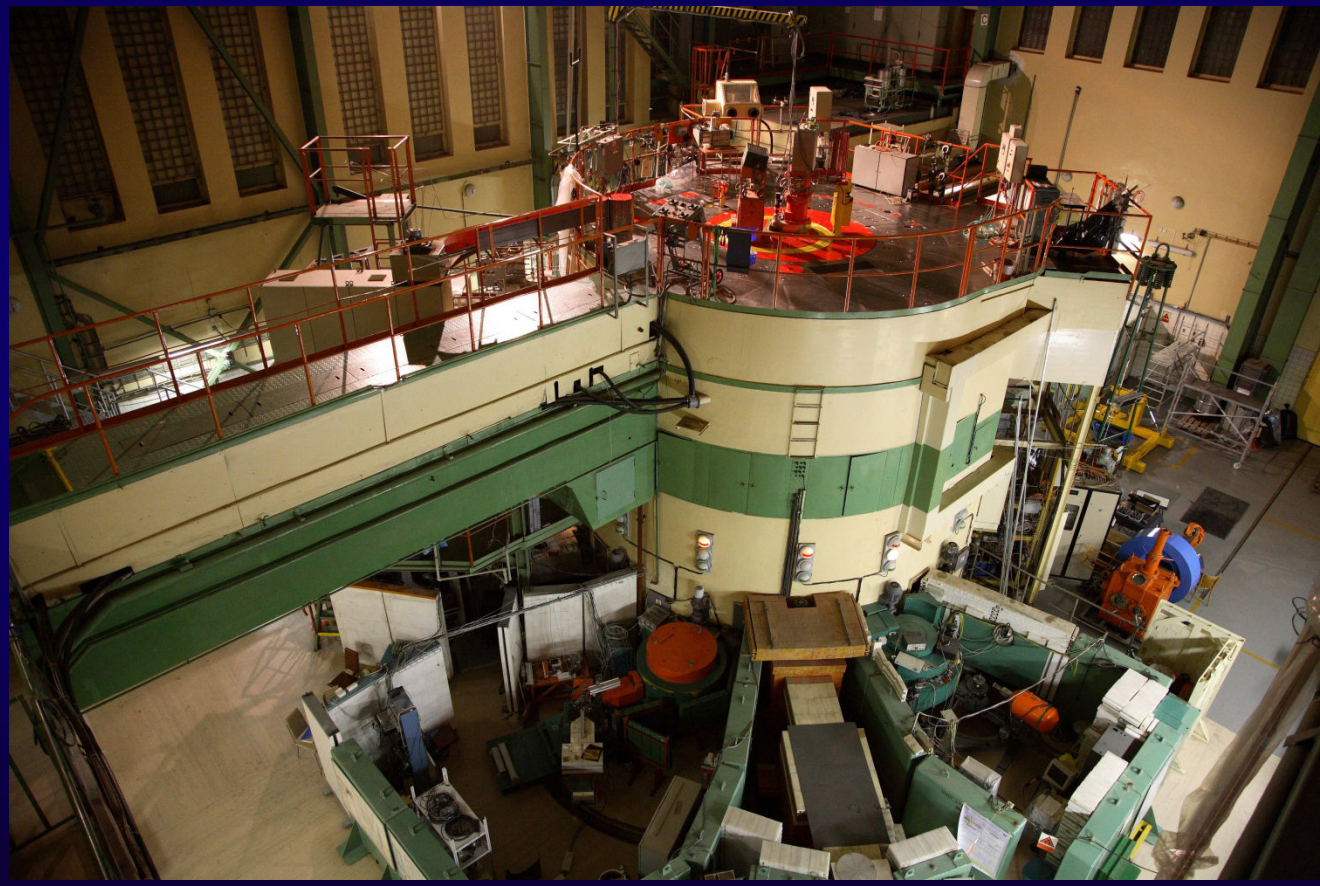
Overview of the BNCT neutron beam line facility in NRI Rez (Prague)

NRI = Nuclear research institute plc
BNCT = boron neutron capture therapy

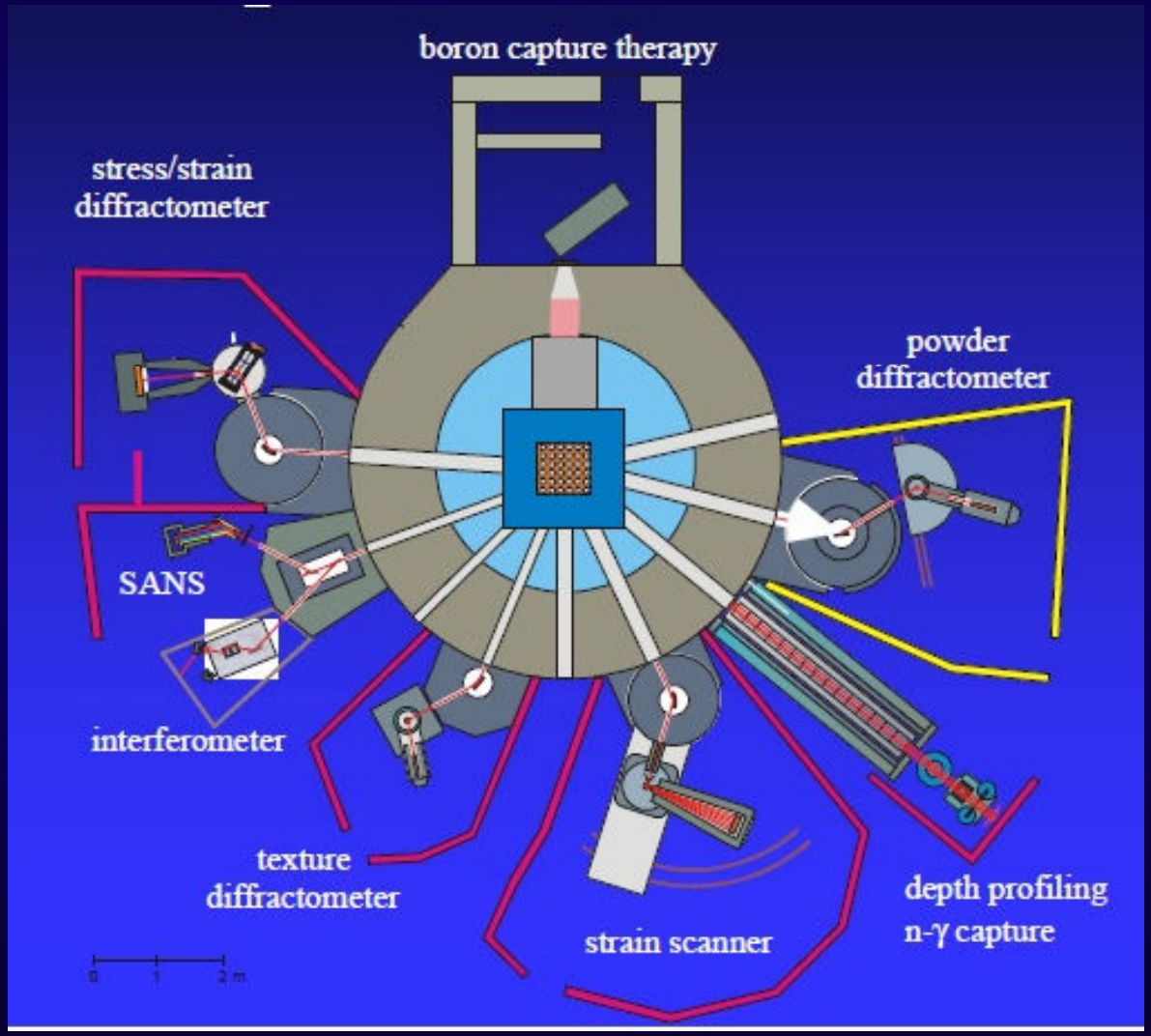
Most pictures taken from presentation of
J.Burian/NRI – Milano09

Research Reactor LVR-15 (10MW)

- 36% enriched U235
- Light water with forced cooling
- Access allowed when reactor ON



Experimental facilities using LVR-15



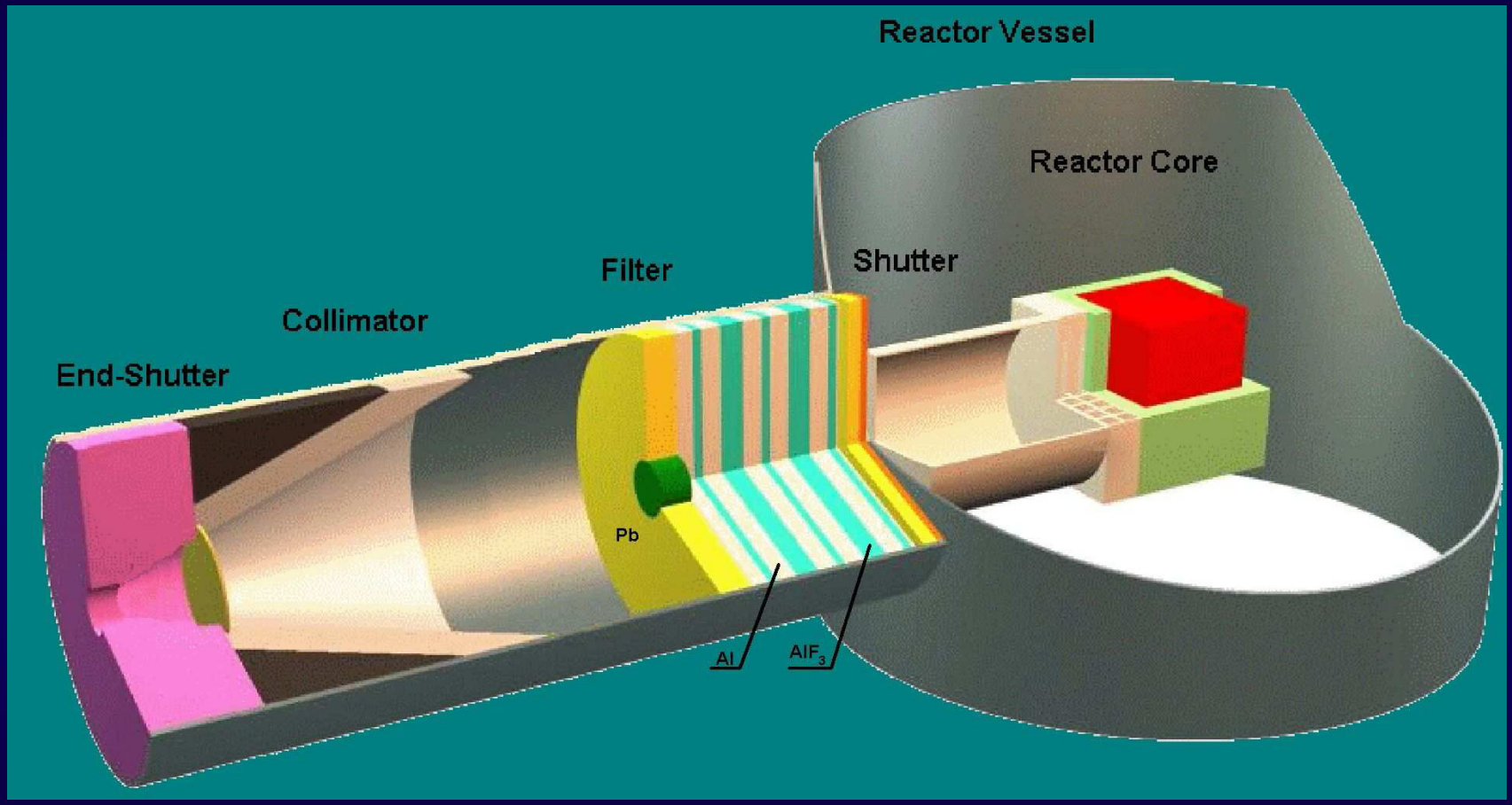
Approximate maximum fluxes

thermal neutron flux at the end of the horizontal beam tube	$1x10^9$ n/cm^{2}s
maximum thermal neutron flux in the core	$1.5x10^{14}$ n/cm^{2}s
maximum fast neutron flux in the core	$3x10^{14}$ n/cm^{2}s
thermal neutron flux in irradiation channel in fuel	$1.2x10^{14}$ n/cm^{2}s
thermal neutron flux in irradiation channel in reflector	$9x10^{13}$ n/cm^{2}s

Material tests possible in the vertical irradiation channels
Dedicated analysis labs available in NRI

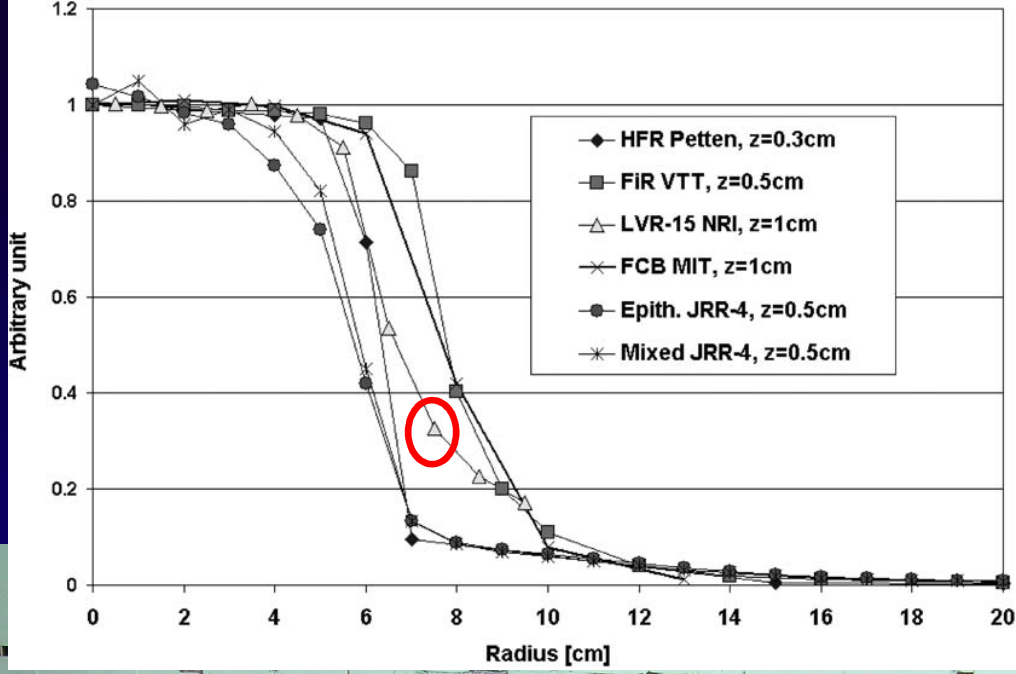
2 Ge spectrometers and a portable one operated by NRI

BNCT line with shutter

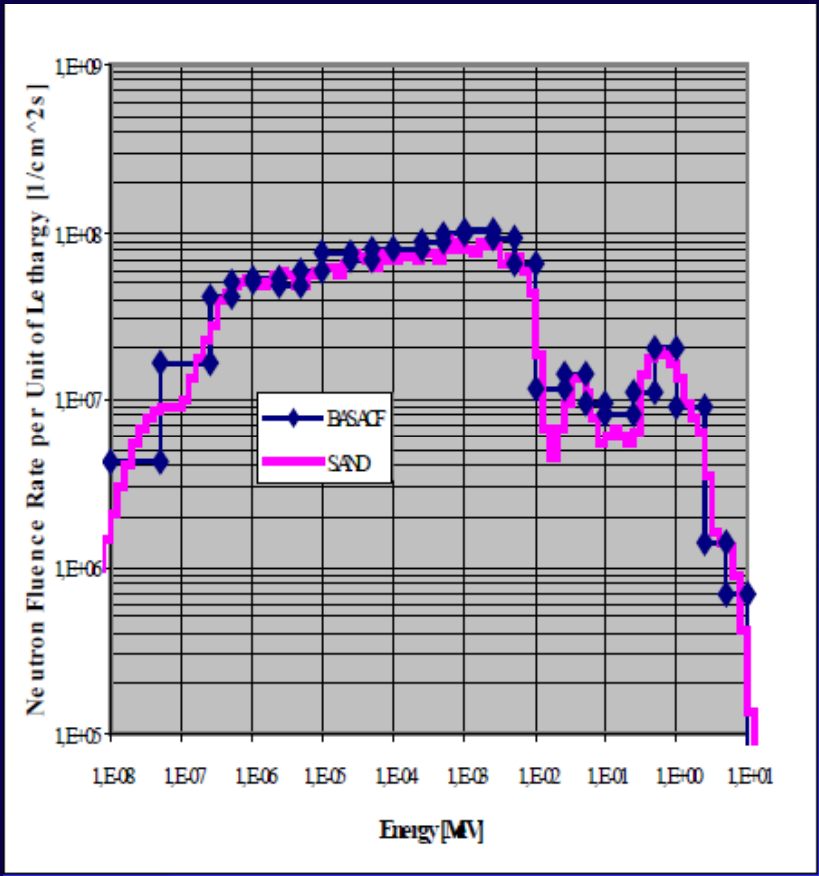


Online epithermal/fast neutron flux monitoring performed with fission chambers ($U^{235/238}$) inside the collimator

- Gamma component up to 0.5 Gy/h
- Control room dose rate ~ 2 uSv/h
- Beam diameter 12cm
- Access possible to the irradiation room when reactor is ON (shutter opens ~5mins)
- x-y Laser alignment available
- Cable feed through 4-5cm only, possibility to pass around the door (2 Fip cables max)
- Desk space limited
- Non-Czech citizens need special permit
- RP control possible outside of normal hours



BNCT spectrum WITH the Li6 filtering Thermal neutrons



- $\Phi_{th} = (1.12 \pm 0.05) \times 10^{8}\ cm^{-2}s^{-1}$
- $\Phi_{epi} = (6.98 \pm 0.27) \times 10^{8}\ cm^{-2}s^{-1}$
- $\Phi_{fast} = (6.94 \pm 0.40) \times 10^{7}\ cm^{-2}s^{-1}$
- $(dK_{fn}/dt)/\Phi_{epi} = 1.45 \times 10^{-12}\ Gy\ cm^{2}$ (estimated 20%)
- $(dK_{g}/dt)/\Phi_{epi} = 7.88 \times 10^{-13}\ Gy\ cm^{2}$ (estimated 20%)

We used 4cm polyethylene moderator (thermalization depth) WITHOUT Li^{6} filter

Spectra to be received next week