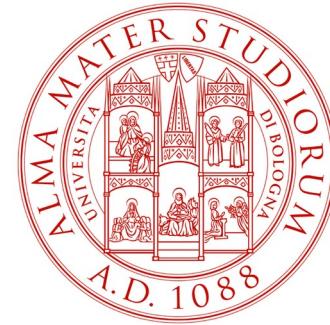
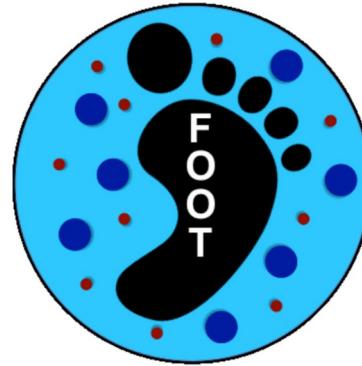


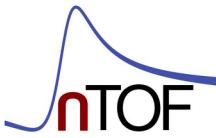


Istituto Nazionale di Fisica Nucleare



Neutron detectors characterization at  nTOF

n_TOF @ CERN

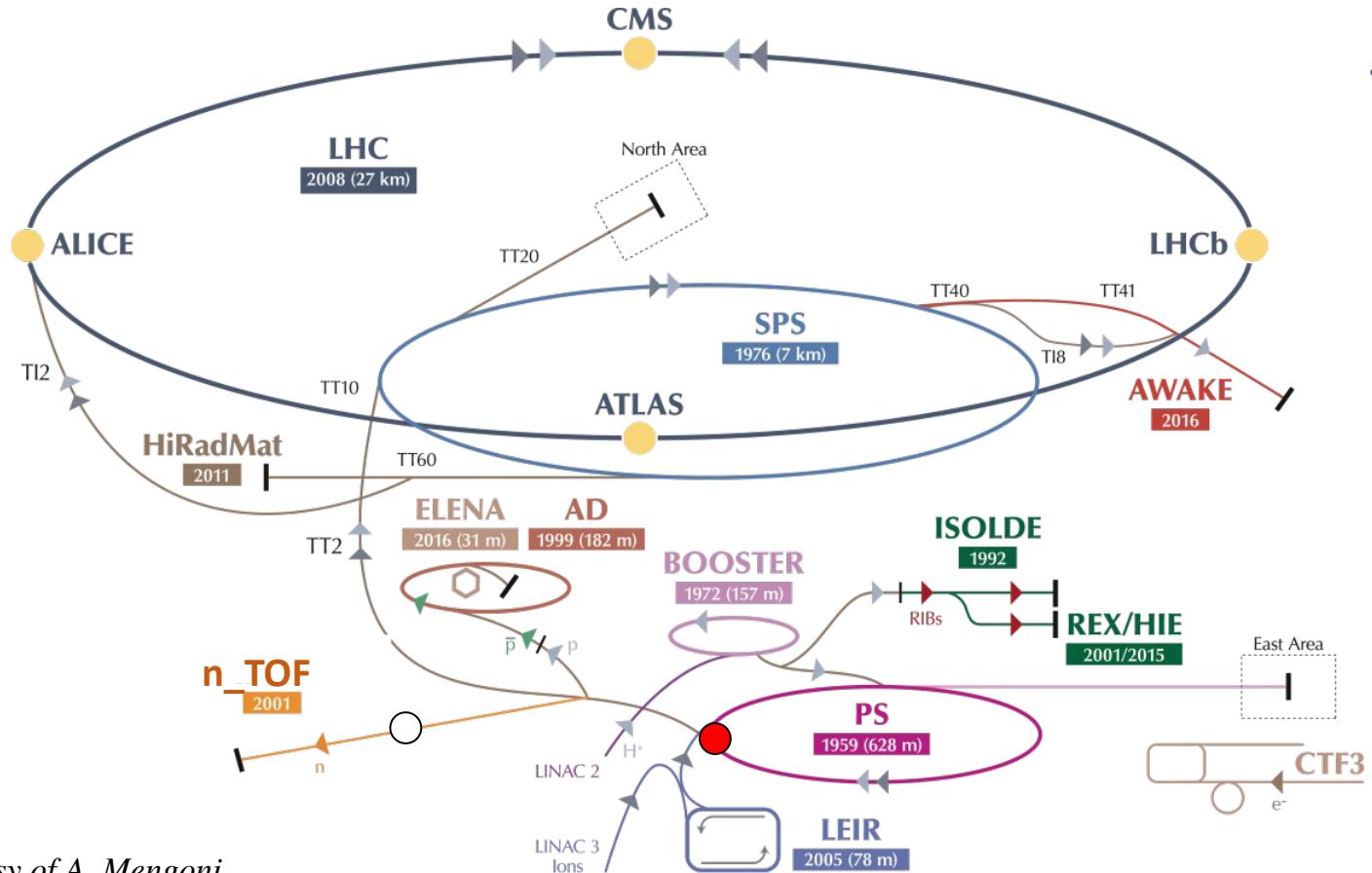


Proton beam

20 GeV/c p from PS

7 ns bunch length

Min. 1.2s btw bunches



Courtesy of A. Mengoni

Neutron flux @ n_TOF



High neutron flux

$7 \times 10^{12} \text{ p} \rightarrow 10^{15} \text{ n}$

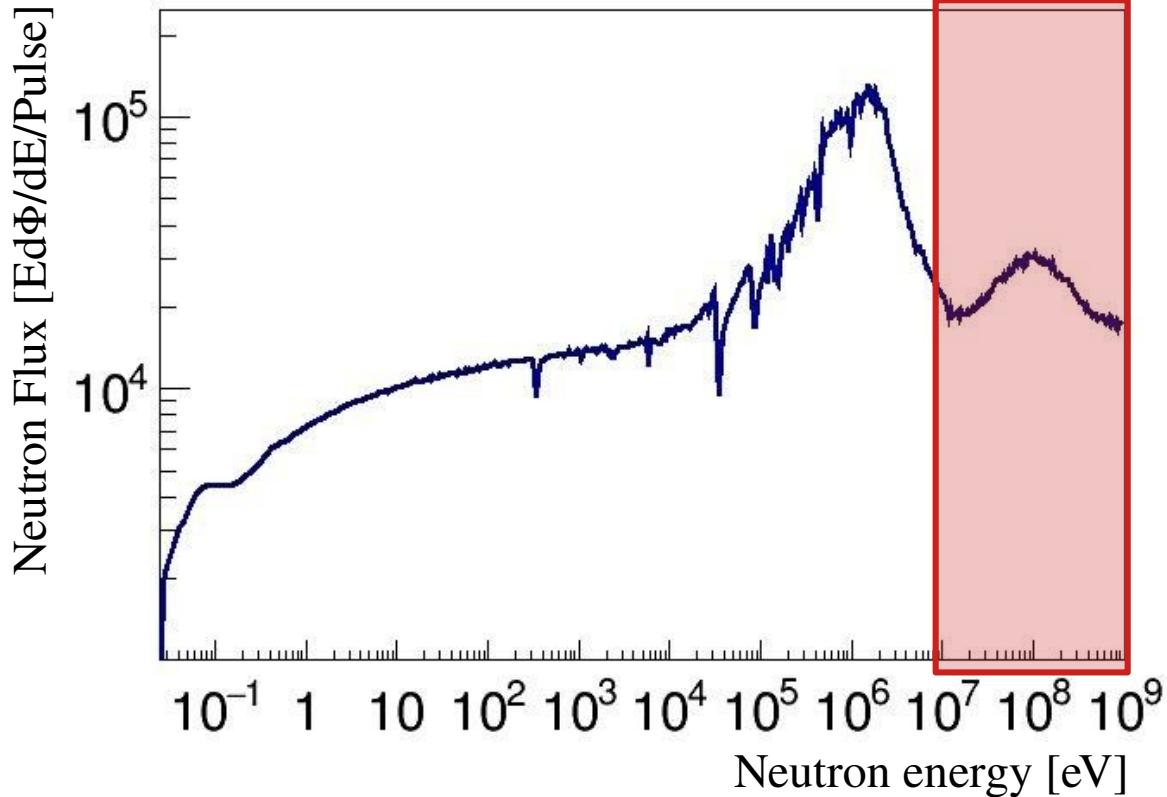
Wide energy range

Thermal – up to 1 GeV

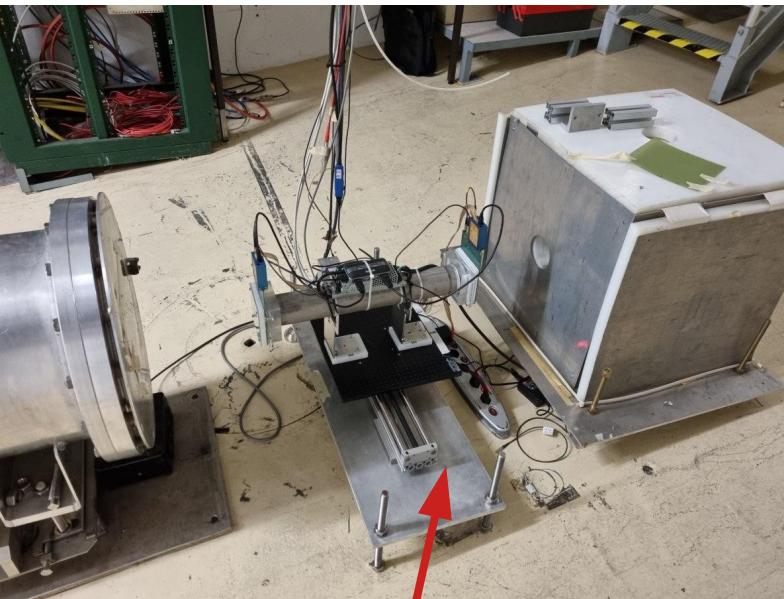
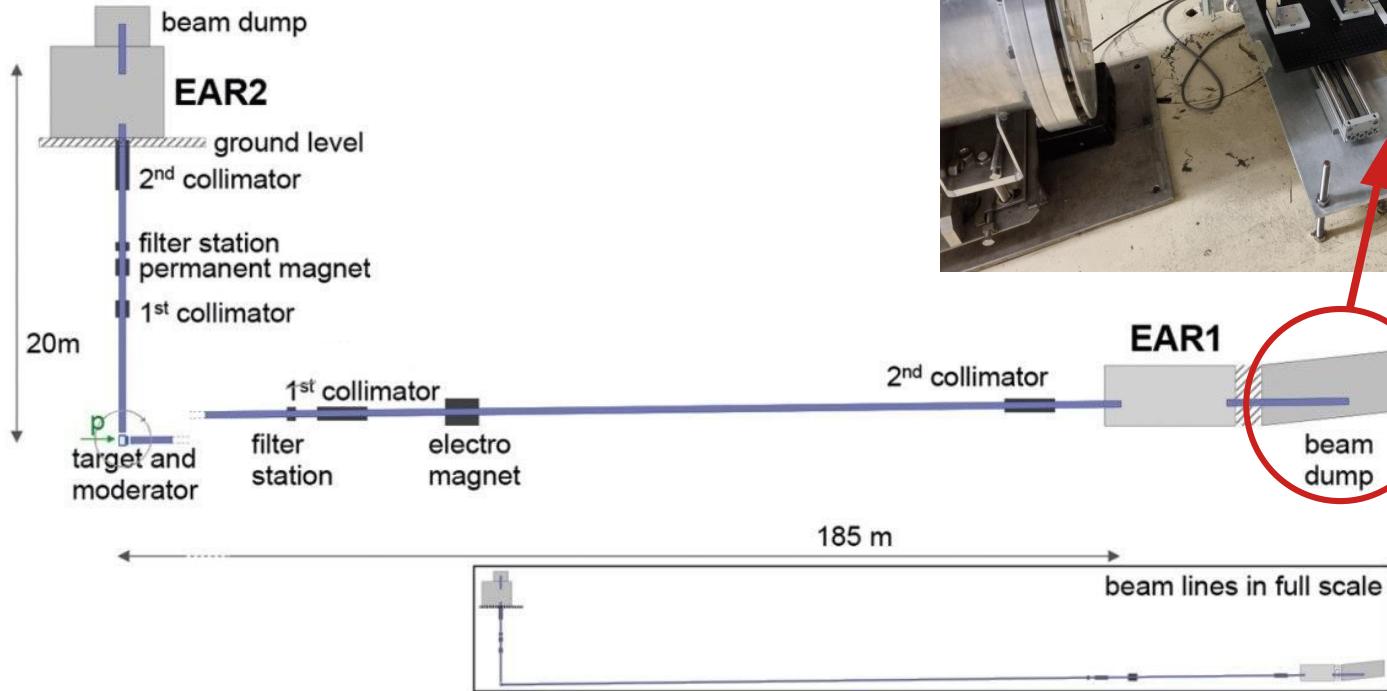
High energy resolution → TOF

EAR1 → 185 m flight path

$\Delta E/E 10^{-5} - 10^{-3}$



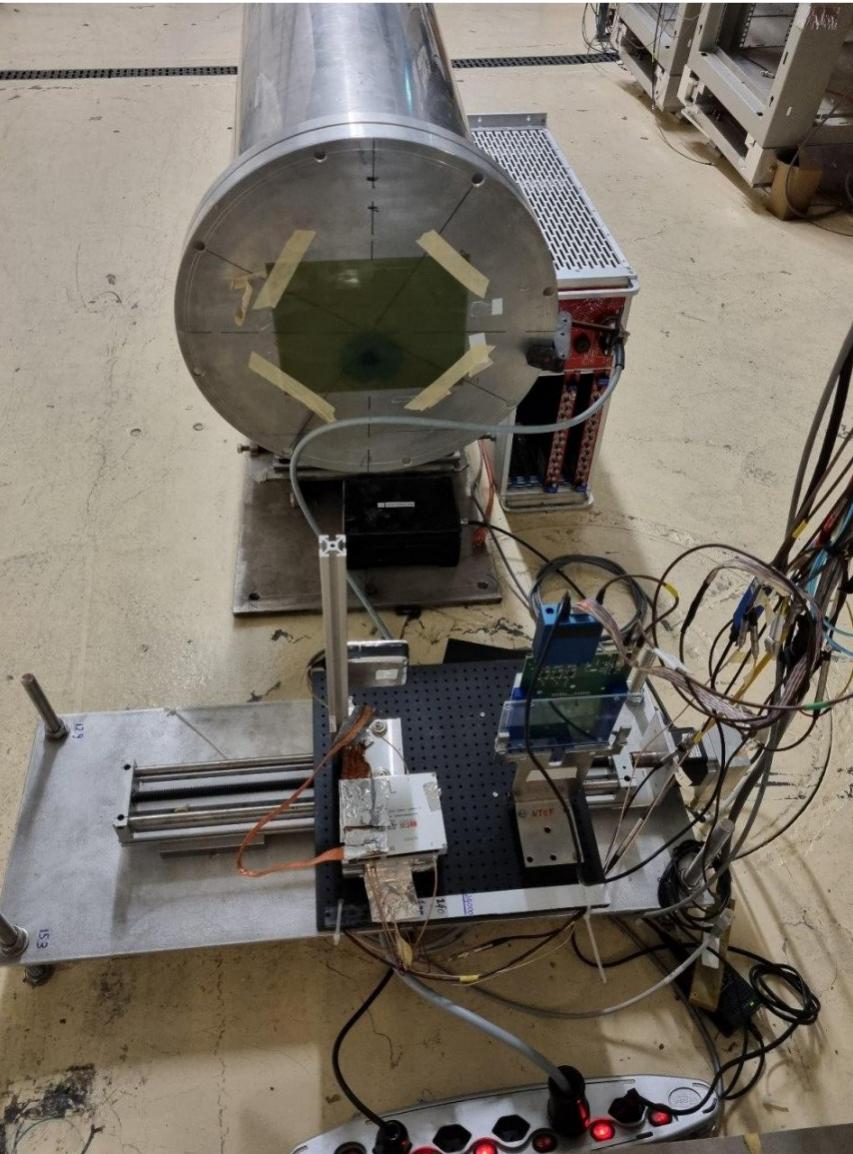
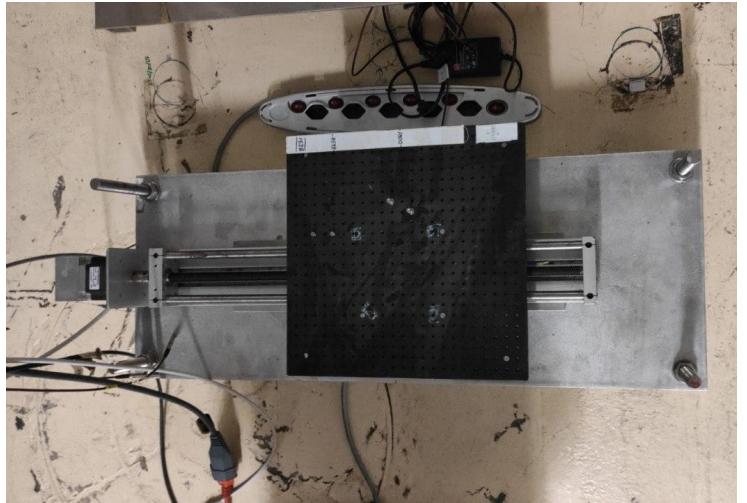
n_TOF @ CERN



Possible to carry out
measurements in the beam
dump ~ 200 m flight path



Beam dump



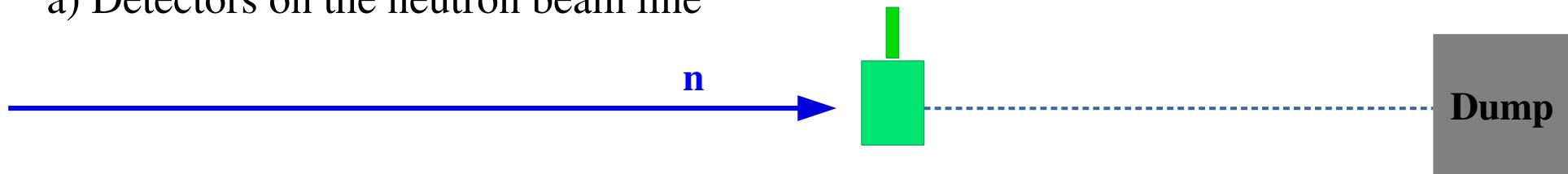
Detector characterization



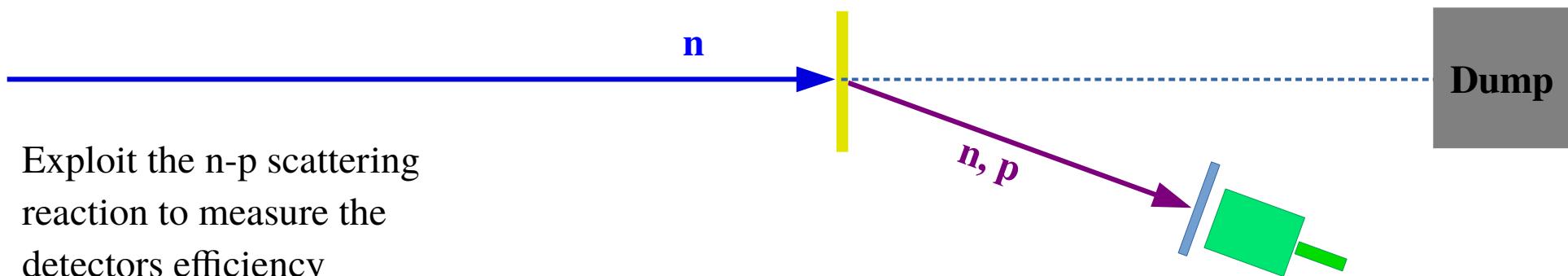
1) Am-Be source for preliminary particle identification ($n-\gamma$) studies

2) Neutron efficiency studied with neutron beam

a) Detectors on the neutron beam line



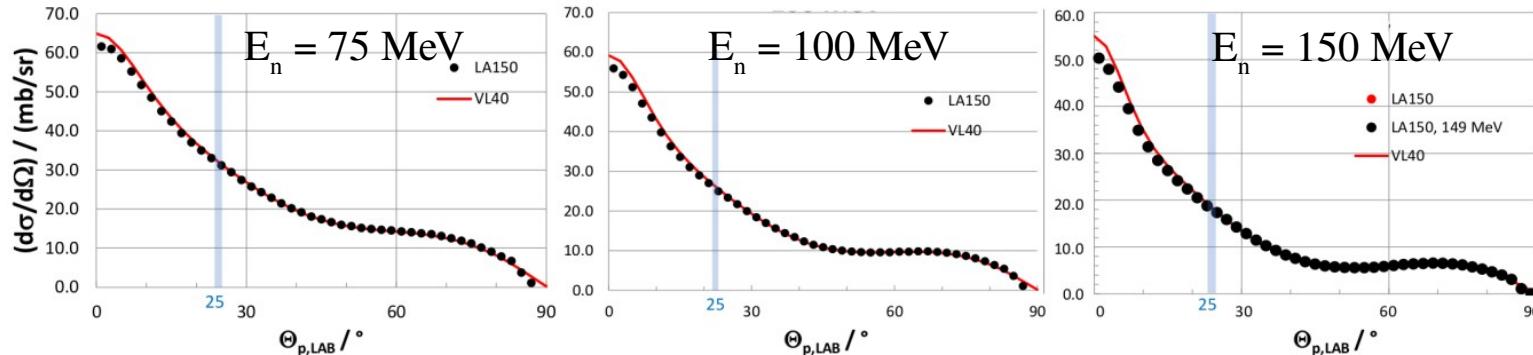
b) PE-C targets on the beam line and detectors (+ vetos) at a fixed angle (20-25°)



Exploit the n-p scattering
reaction to measure the
detectors efficiency



Detector characterization

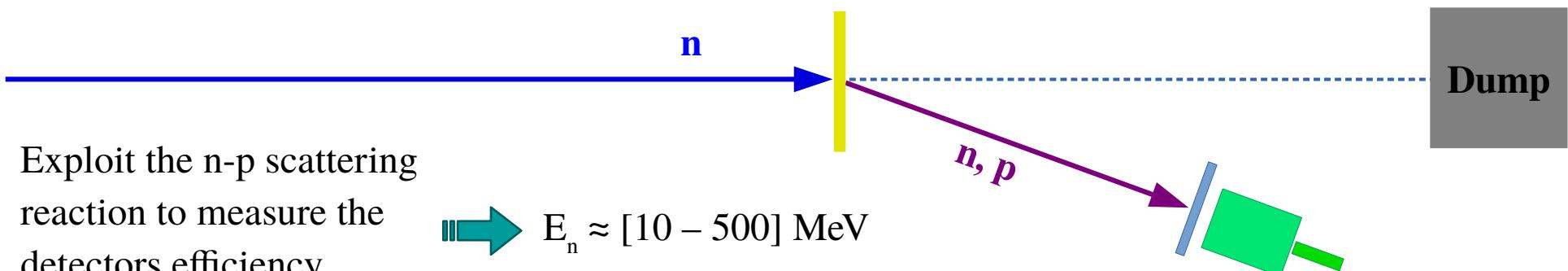


$$100000 \text{ neutron/bunch} \cdot d\sigma/d\Omega \cdot d\Omega \cdot n \approx 16 \text{ neutron/bunch}$$

$$d\Omega = 0.2 \text{ sr}$$

$$n (\text{PE, th } 5 \text{ mm}) \approx 0.04 \text{ at/barn}$$

b) PE-C targets on the beam line and detectors (+ vetos) at a fixed angle ($20-25 {}^\circ$)





Detector characterization

Stuff available @ n_TOF:

- DAQ:

fADC 12bit

Full Scale Input Range 0.1-5 Vpp

1 GSPS

100 ms acquisition time

- HV channels:

- up to 3.5kV, uA - 3mA (1 a 4kV)

+ up to 3kV, 200-20 uA

