Preliminary Experimental Study of Back-n White Neutron Characterization at CSNS

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WNS collaboration

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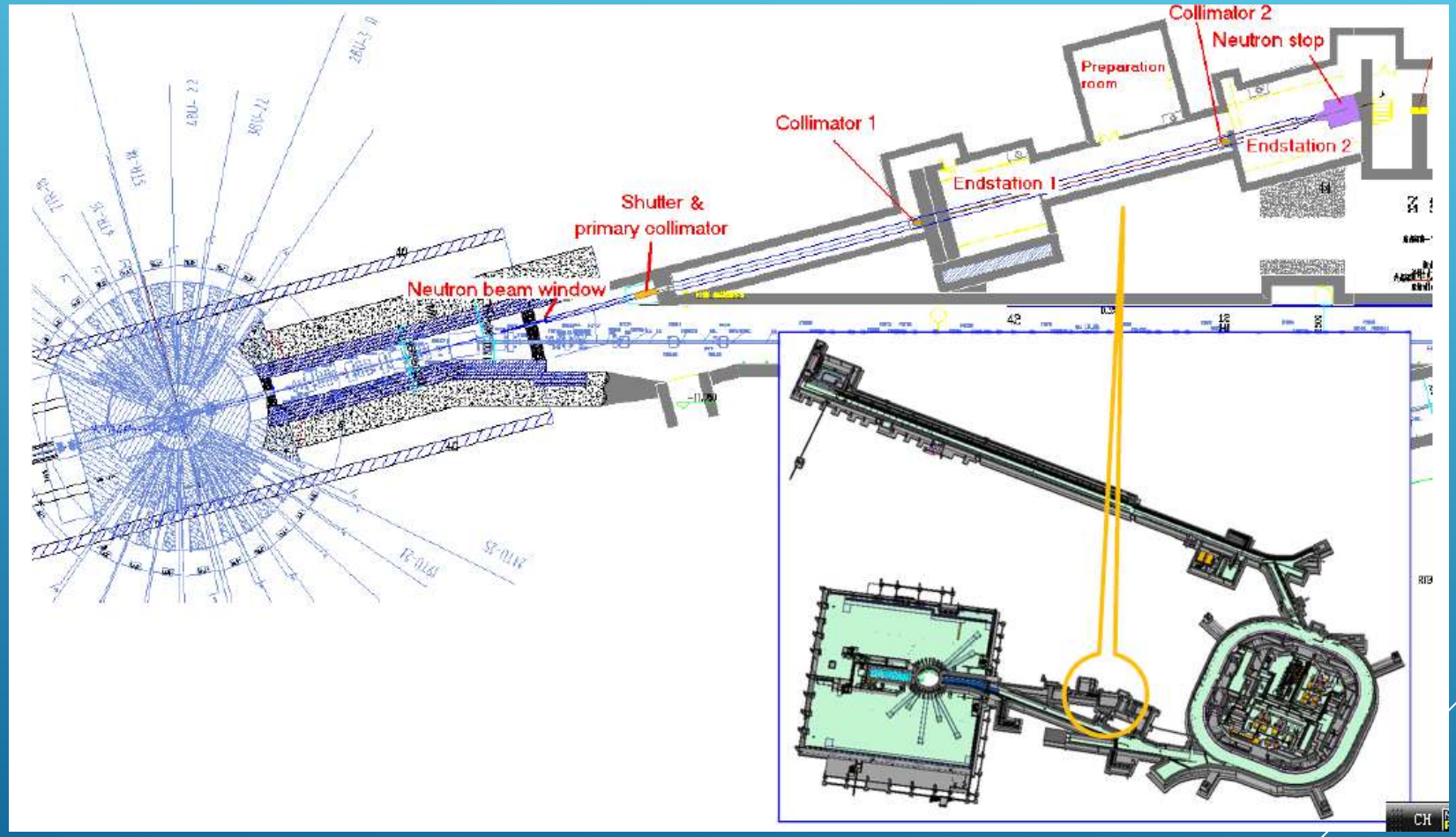
OUTLINE:

- 1 Introduction of CSNS back-n white neutron source
- 2 Experiments of white neutron beam line
- 3 Preliminary results and future plan

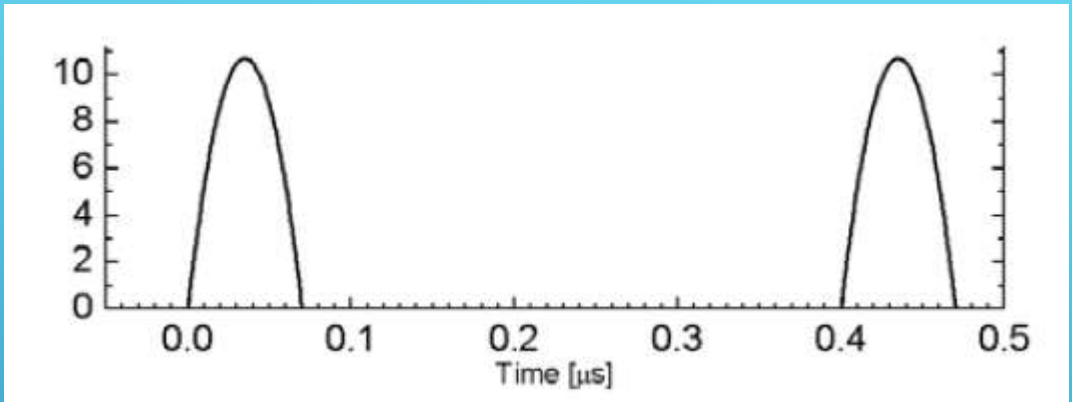
BACK-N WHITE NEUTRON BEAM LINE @CSNS

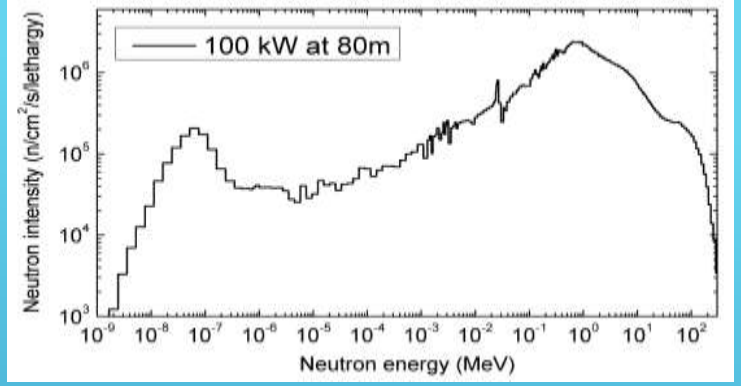


- Neutron energy spectrum;
- Neutron flux;
- Beam profile;

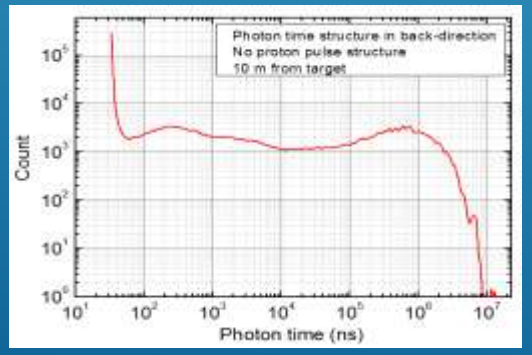
- Beam bunch Time structure

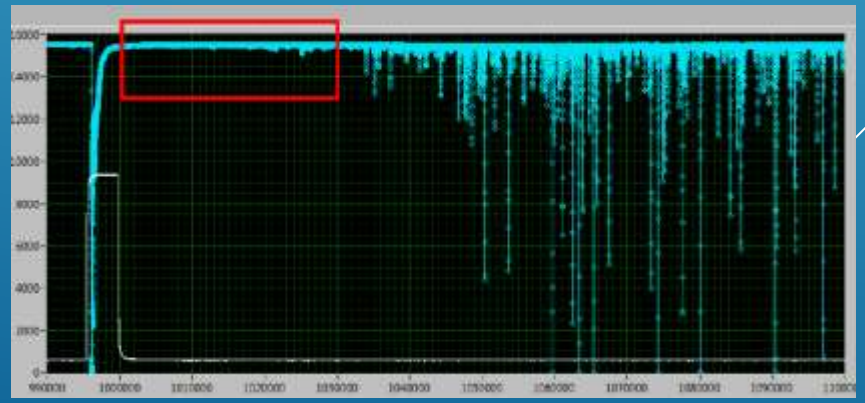
NEUTRON BEAM CHARACTERIZATION OF WNS





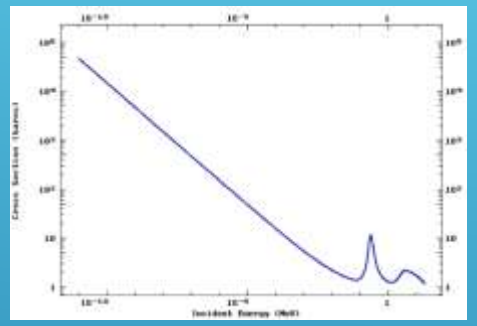
- Neutron energy range:eV-100MeV
- Neutron yield: ~10^{16}/s@100kW
- 25Hz double-bunch operation mode
- High intensity gamma-flash

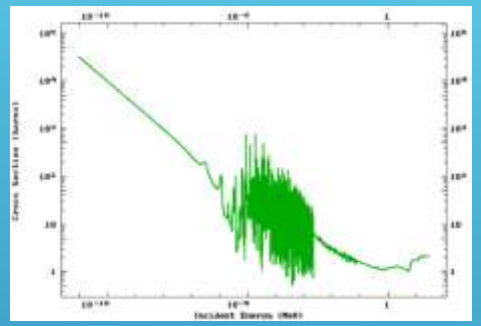


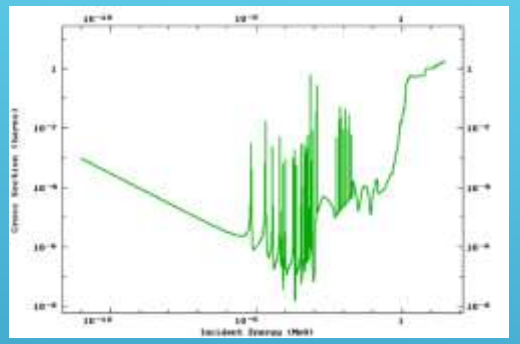


NEUTRON ENERGY MEASUREMENT

- Li6/U235/U238..



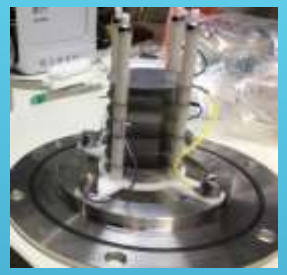


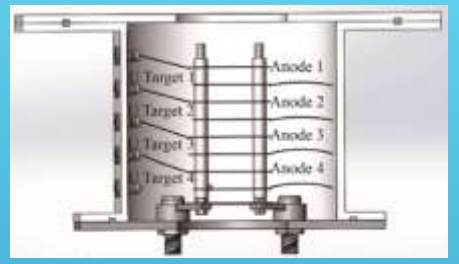


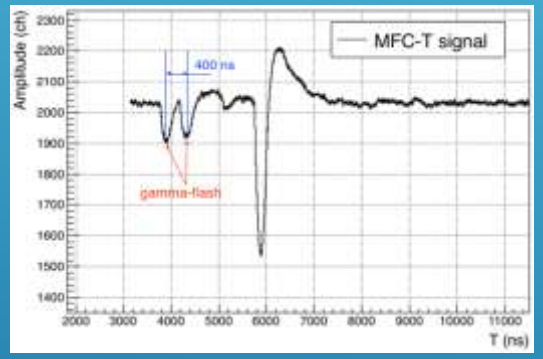
- Recommend of IAEA

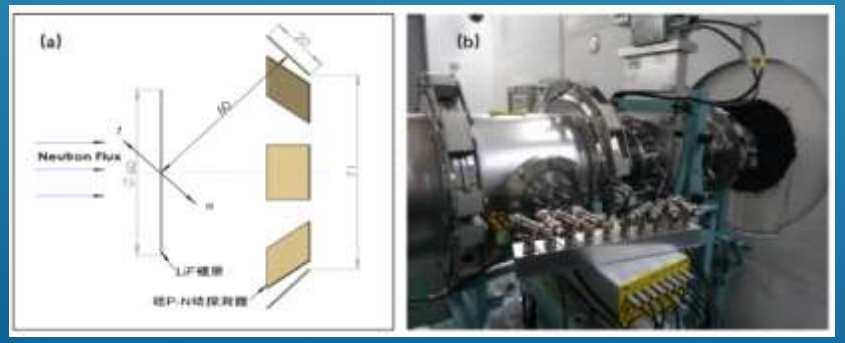
Reaction	Range	Cross section&uncertainty
6Li(n,a)T	Thermal~100keV	10^{-5}eV~90keV <1% 90~450keV 1~2%
235U(n,f)	Thermal~200MeV	Thermal 0.2% 150keV~16MeV ~1% 16~200MeV 2~5%
238U(n,f)	1.2MeV~200MeV	1.2~20MeV ~1% 20~200MeV 2~5%

- Thin target
- ToF method
- Detector

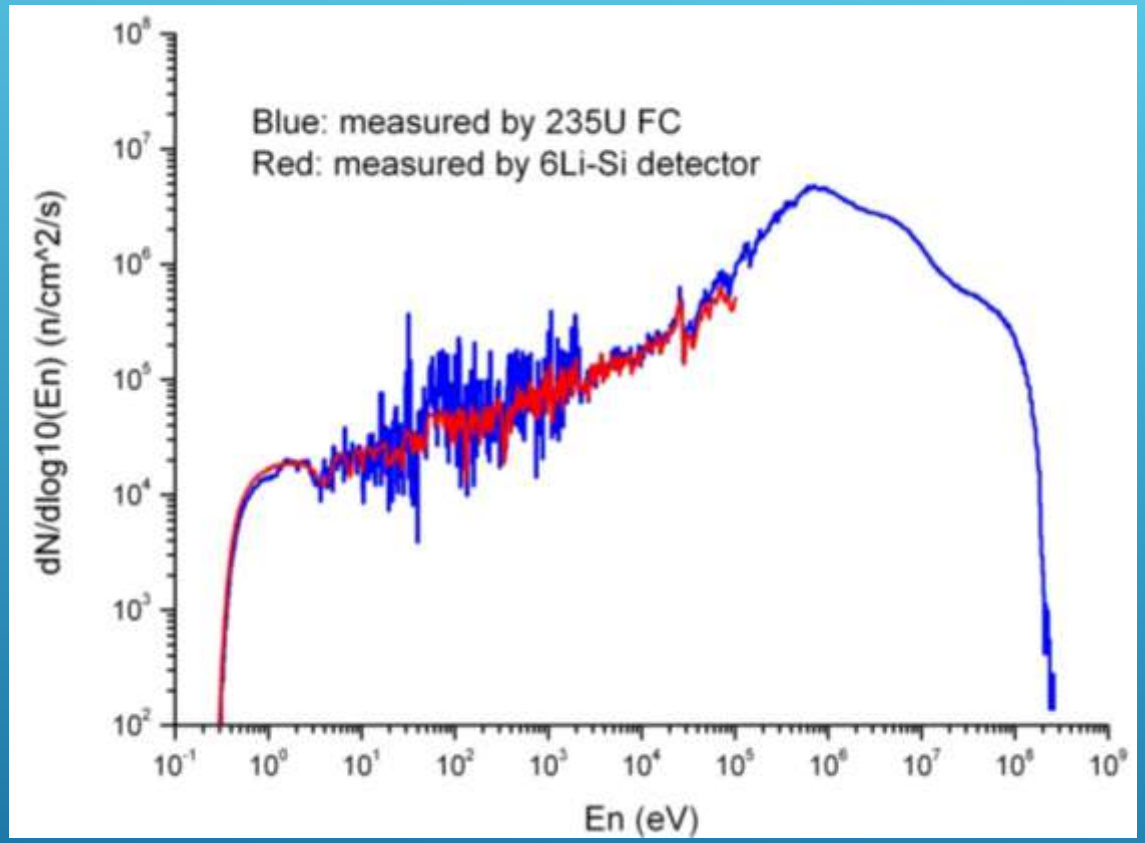






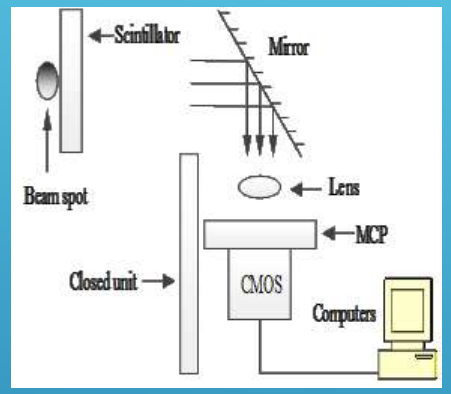


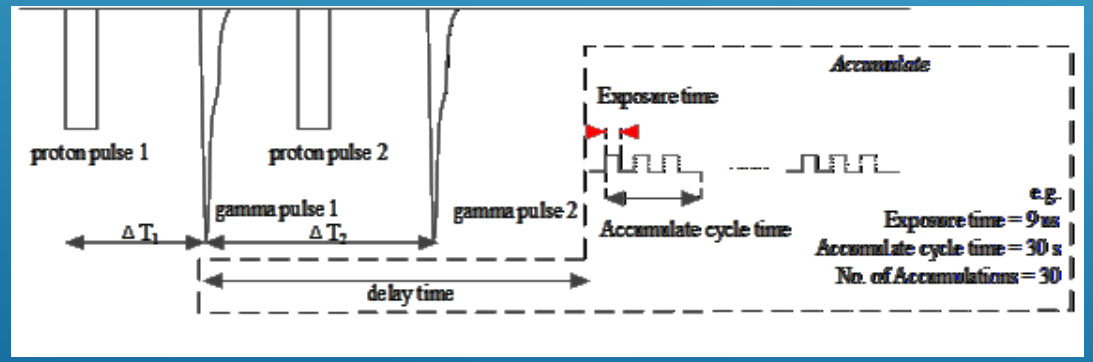
$$\Phi(E) = \frac{N(E)}{\sigma(E)\varepsilon N_V}$$

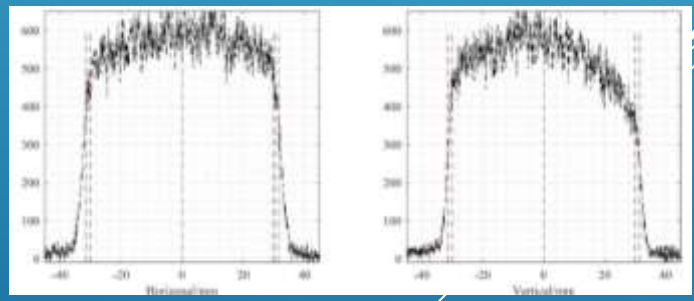


Neutron energy spectrum

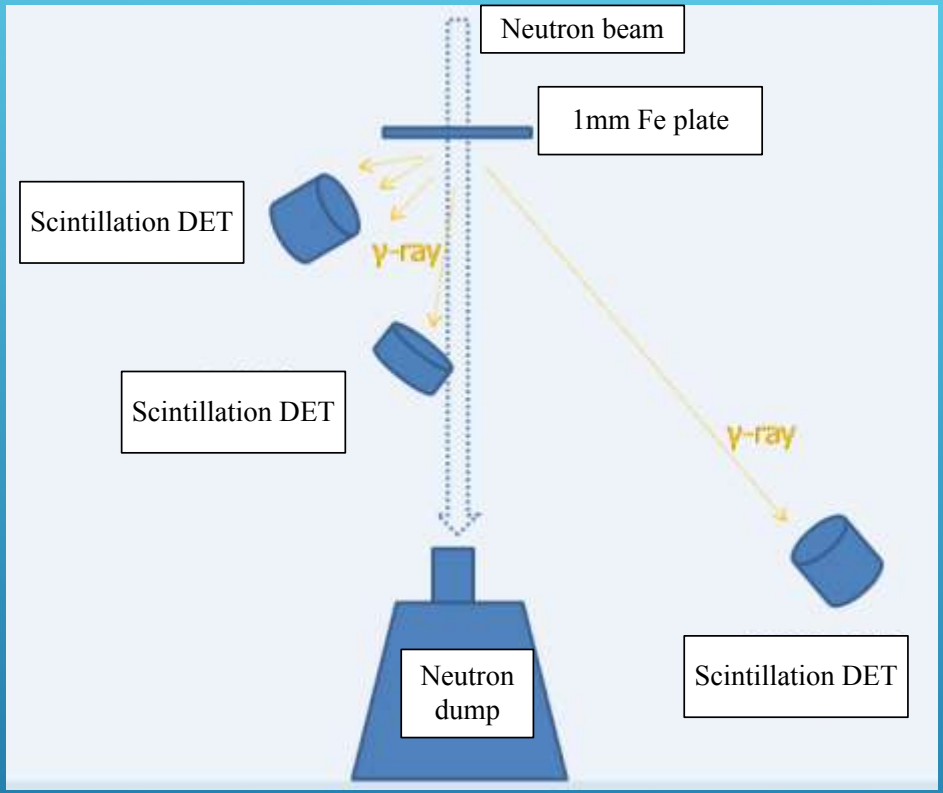
BEAM PROFILE

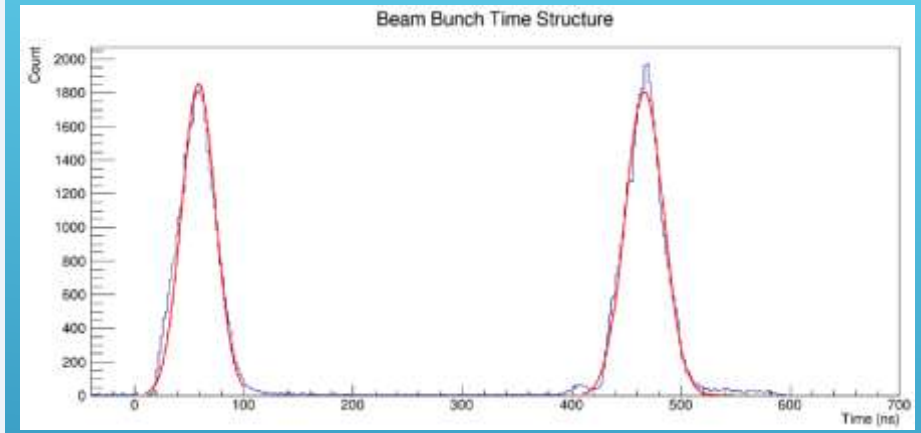






BEAM BUNCH TIME STRUCTURE





- FWHM:41.6±2.0 ns
- Interval time:409.0±2.0 ns

OUTLOOK

- Determination of neutron energy spectrum
- Determination of neutron flux

- Thanks for your attention!