

# Experimental Muon Source (EMuS) Target Station Shielding Design for "Baby Scheme"

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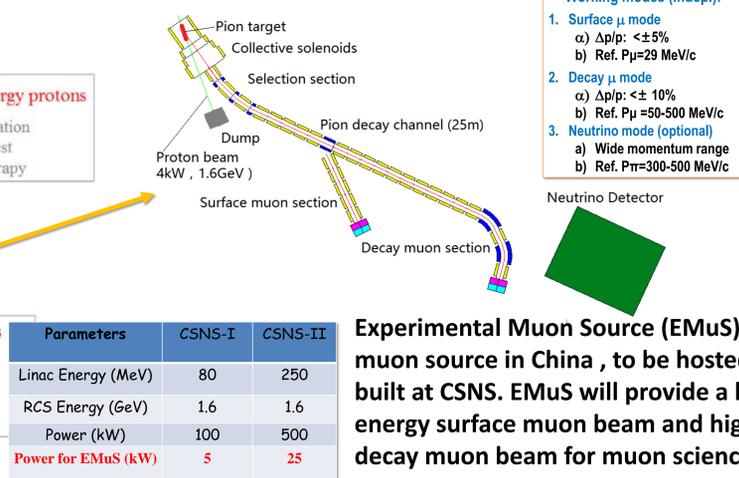
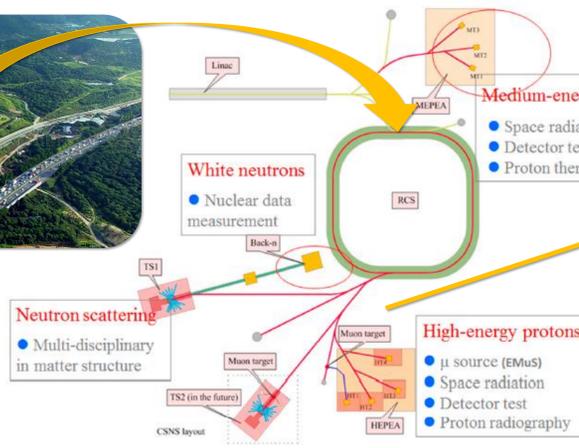
## 1. Introduction



China Spallation Neutron Source (CSNS) complex is a large multi-discipline research facility that hosts a 100 kW powerful proton accelerator capable of providing proton beam of 1.6 GeV.

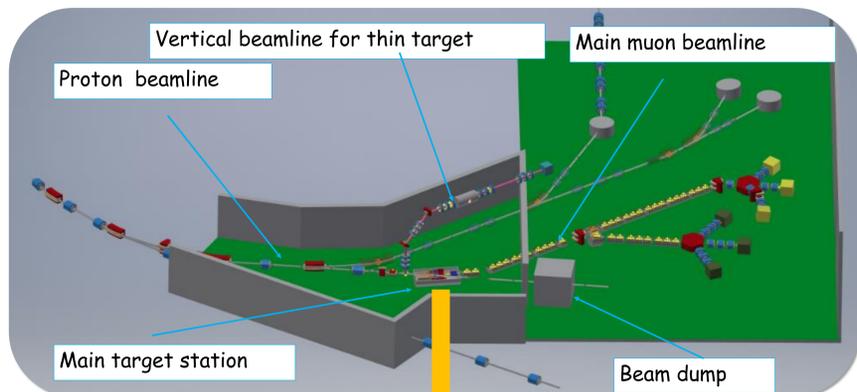
Layout of CSNS accelerator complex

EMuS Layout and Working Modes

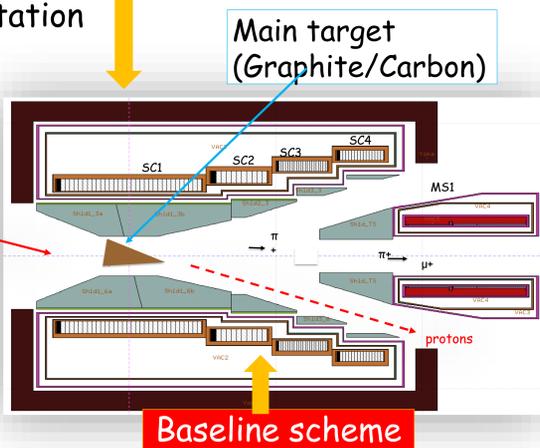
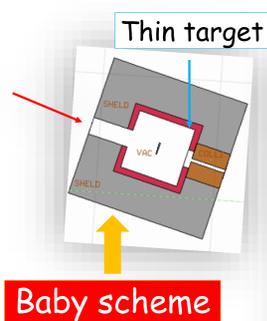


Experimental Muon Source (EMuS) is a first muon source in China, to be hosted and built at CSNS. EMuS will provide a low energy surface muon beam and high energy decay muon beam for muon science.

## 2. EMuS target station area

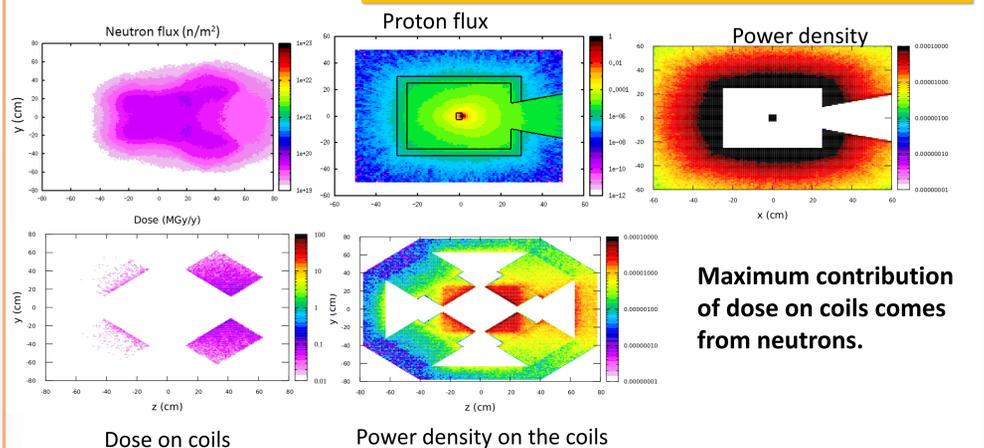
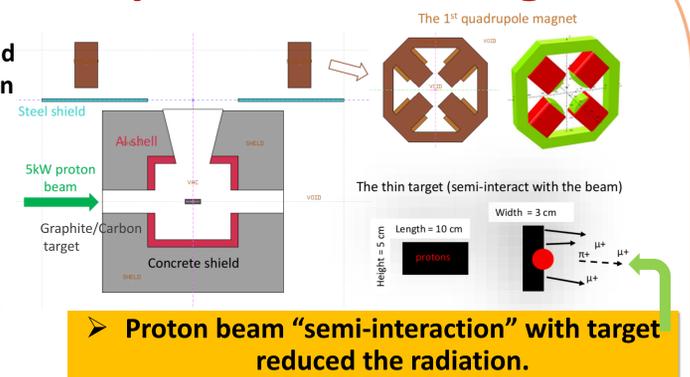


EMuS Target station

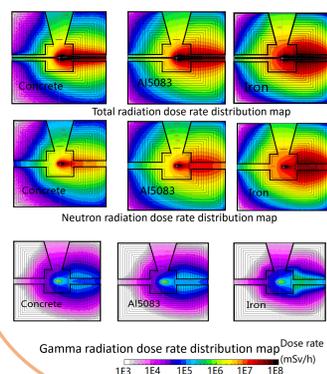
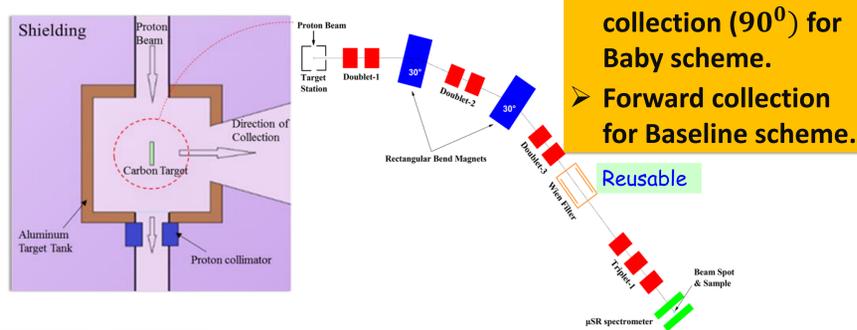


## 4. Critical components shielding

High radiation produced due to beam interaction on target can degrade some of the critical components of the target station, e.g., magnetic coils and epoxy. Shielding is required to protect the coils from radiation.



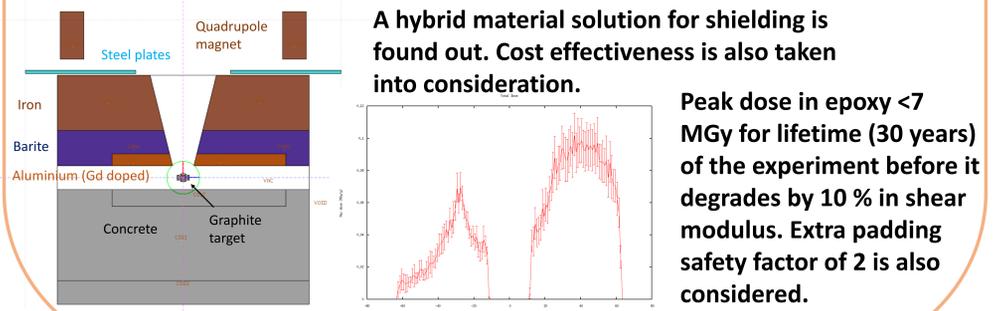
## 3. Baby scheme



➤ Radiation in the target area is mainly caused by neutrons and gamma rays, where neutron rays have much more influence than gamma rays.

➤ The neutron dose rate is the smallest when using concrete for the shielding; The gamma dose rate is the smallest when using iron for the shielding;

## 5. Hybrid shielding solution for 25 kW



A hybrid material solution for shielding is found out. Cost effectiveness is also taken into consideration.

Peak dose in epoxy < 7 MGy for lifetime (30 years) of the experiment before it degrades by 10% in shear modulus. Extra padding safety factor of 2 is also considered.

## 6. Summary and acknowledgements:

Preliminary solutions for EMuS under Baby Scheme for 25 kW beam is found out. It consists of hybrid shielding with different materials. The peak dose is well within the considered dose limit with an extra safety factor of 2.

The author is highly thankful to Prof Yuan Ye, Prof Tang, Prof G. Zhao and Dr. Nikos Vassilopoulos. The work has been supported by grants from Institute of High Energy Physics, Chinese Academy of Sciences Beijing.