

MEGAPIE on track:

SINQ-MEGAPIE – has started user operation with the first Mega Watt class liquid metal target.

On the 21st of August 2006 the PSI neutron user program started after an extended shut down, in which a new liquid metal target, the MEGAPIE target, was installed. PSI is thereby the first facility World-wide to operate in user mode with a high power liquid metal target. Our first measurements indicate that the estimated gain in neutron flux of 40 % was conservative.



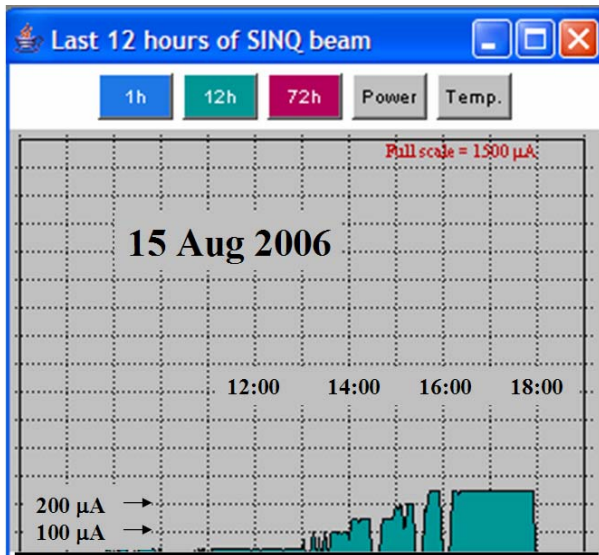
First Beam on Megapie

The commissioning of the new target started on Monday August 14, 2006. The MEGAPIE target received its first protons and produced its first neutrons at about 15:30. This was closely followed both in the accelerator (below) and the SINQ (left) control room's



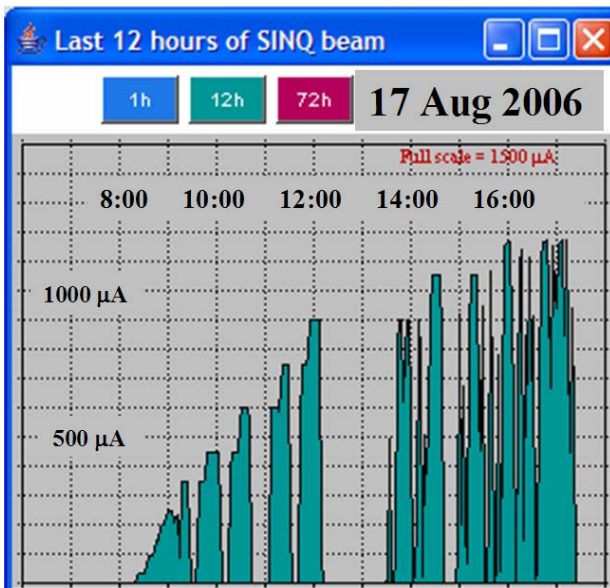
Phase 1 of beam commissioning:

At a relatively stable and constant beam current of 40 μA , which corresponds to about 25 kW of beam power, the target accumulated a total charge of 60 μAh . Hereby the goal of Phase 1 of the start-up procedure was accomplished.



Phase 2 of beam commissioning:

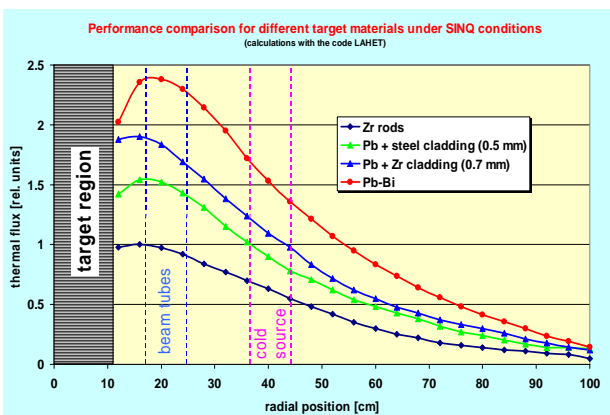
The second phase of the start-up procedure was successfully accomplished on the 15th of August, where the power was stepwise increased to 150 kW (250 μA proton current). The goal of this phase was to check and verify the response of the heat removal system at power conditions comparable to those used, when operated out of beam at the test stand in the autumn of 2005.



Phase 3 of beam commissioning:

The third and final phase of the start-up procedure was successfully accomplished on the 17th of August, where the power was stepwise increased to full power 700 kW (1200 μA proton current). After some 10 minutes time with stable proton beam at each step, the beam was interrupted to follow the temperature transients in the target.

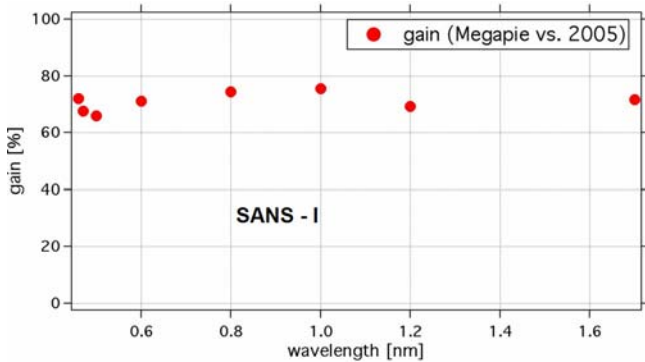
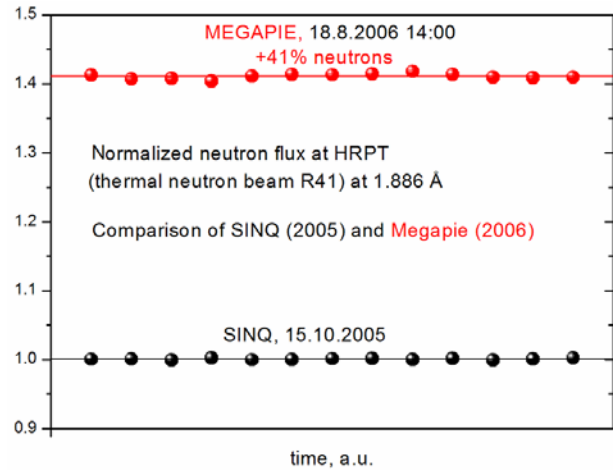
All systems operated very stable at all power levels – and after a final review of the target performance and a monitoring of radiation levels around the target station and around the instruments it was concluded that normal user operation could be started.



Predicted target performance:

The liquid metal target was predicted to provide a 40% increase in neutron flux (at identical current) as compared to our standard solid Pb target.

The predicted neutron flux distribution in SINQ (left) with Megapie (Pb-Bi – red line), the first SINQ target (Zr rods – black), the normal solid SINQ target (Steel clad Pb – green) and a potential further development of the solid target (Zr clad Pb – blue line).

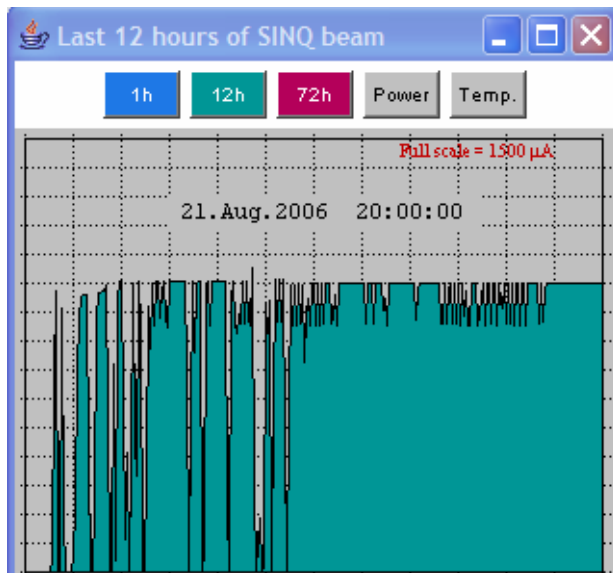


Target performance:

The performance of the Liquid metal target was tested on the 17 and 18 August.

The thermal flux was measured on the powder diffractometer HPRT. An increase in flux of 40% was observed. (see figure to the left)

The cold flux was measured on SANS-1. The white beam – as seen by the monitor - was found to have been increased by approximately 60%. The wavelength dependent gain was measured at a stable beam current of 1000 μA , and is shown in the figure to the left.



Start of Normal User operation.

Normal user operation was started on August 21st around 8:30 and is planned to continue until the normal annual winter shut-down starting on December 23rd 2006.

The first 12 hours of proton beam is seen to the left.

