

Tandem Operation

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In 2006 the tandem accelerator was running 6800 hours (283 days) for experiments. For maintenance each week 6-8 hours were scheduled but not used always. In July and August we had a long maintenance period where all the machine was cleaned very thoroughly. This was necessary because it was no longer possible to run the machine stable for longer times with high terminal voltages up to 13 MV. All structures of column and accelerating tubes were cleaned with cotton belts. A lot of idler pulleys were replaced because the polyurethane elastomer has become brittle or in some cases gotten the consistency of chewing gum, which polluted the charging chains a few times. This caused in the months before several tank openings for removing the rubber parts from the tank floor or the charging chains, respectively. After this long maintenance and conditioning we were able to reach 14 MV at the end of the year.

The ordered new spare idler pulleys are stored now inside the tank under dry SF₆ atmosphere. Upon the advice of the Heidelberg Tandem people, moisture is a problem for the material of the idler pulleys, which we hope to avoid when storing under SF₆.

The chains on HE side installed in September 1990 are still in operation. Last year we had to replace the chains on the LE side, which were younger but close to a chain rupture due to abrasion.

Operating statistics are shown in fig. 1 and table 1. The maximum terminal voltage applied for experiments is shown in fig. 1. About 41% of the available beam time is devoted to fundamental physics (34% nuclear physics, 7% for measurements of cross-sections for astrophysical reactions). In the field of applied physics the available beamtime is distributed to AMS (18%), materials analysis (26%) and biology (14%). The small rest of about 1% served for checks of new setups like MLL-Trap or detector tests for CRESST. The instrument most frequently in use, with about 21% of available beam time, was the Q3D magnetic spectrograph for nuclear physics as well as applied physics. The Microprobe SNAKE accounts for 14% of beamtime due to studies in single ion radiation of living cells.

The control system based on an ARCNET network with about 60 node computers was running very stable all the year. Almost no new features were implemented and al-

most no changes in the programs were done. A problem of our aging electronics is that it becomes more and more difficult to purchase spare parts. Some redesign of PCBs is necessary to solve this problem for the near future. For a longer time of operation the change to an other up to date controlsystem, perhaps based on PLCs is under discussion. This system change will be expensive and time consuming and can be implemented only in a step by step procedure, where the old and the new system are running in parallel.

The post accelerator SchweIN was dismantled and removed completely from Target room II. At the new available space now the setup of MLL-Trap is in progress. Since April we have the permission to operate a neutron generator based on a D-T reaction in Target room II. The high energetic neutrons of 14 MeV are usefull for detector tests for CRESST. The new door locking system based on a Siemens Simatic with a visualisation on a WinCC screen is operational since October.

In 2006 we had 550 visitors in groups most from schools and 650 visitors at the open house.

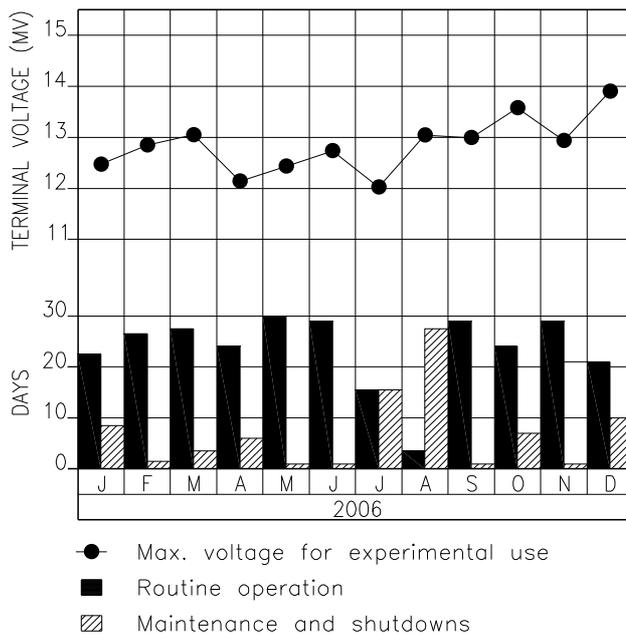


Fig. 1: Operating statistics 2006

ION	¹ H	² H	³ He	⁴ He	⁷ Li	¹¹ B	¹² C	¹⁶ O	³² S	³⁵ Cl
%	16.0	0.4	3.6	2.3	7.3	6.6	4.8	7.5	3.0	3.0
ION	³⁶ Cl*	⁴⁰ Ca	⁴¹ Ca*	⁴⁴ Ti*	⁵³ Mn*	⁵⁸ Ni	⁶⁰ Fe*	⁶³ Cu	¹²⁷ I	¹⁹⁷ Au
%	0.7	4.8	3.9	1.2	7.6	3.2	5.8	0.2	8.5	9.6

Table 1: 2006 ion beam time in percent of total available beam time. The isotopes marked with an * were measured in AMS studies. The ion Source for polarized Protons and Deuterons delivered about half all Protons and Deuterons in a running time of about 550h.