

DIRAC Annual report 2007 (L. Tauscher, DIRAC Contact Person)

After having lost the 2006 beam time our efforts in 2007 were concentrated on installing and tuning the new set-up, necessary for the measurement of πK atoms, and on taking data with a Pt target for enhanced break-up of πK atoms.

Beam (R.Steerenberg, A.Grudev, L.Gatignon and their colleagues from PS division):

1. The **micro duty cycle** of the extracted proton beam was significantly improved by increasing the de-bunching time and by two-bunch injection.
2. The **intensity of the proton** beam during extraction was adjusted such that our trigger rate was constant over the spill length.
3. Installation of the **new power supply** reduced intensity oscillations at our target.

These improvements lead to significantly lower accidental rates and dead time and allowed us to increase the intensity. The cooperation with PS was excellent throughout the run.

New installations and tuning:

1. Two new **Scintillation Fiber Detectors** (SFD-x,y) were installed and tuned. They provide a precision of 60 μm each. In addition an old SFD-w (120 μm resolution) plane was used. During data taking the SFD-y,w were read out with old electronics. SFD-x and Ionisation hodoscopes were read out with new electronics.
2. For enlarging the momentum acceptance for πK detection new **horizontal and additional new slabs of the vertical hodoscopes** were installed in 2006 and tuned and implemented into the trigger in 2007.
3. One **aerogel threshold Cherenkov detector** (necessary for $p-K$ separation) was built and installed in the positive arm of the DIRAC setup. It was tuned and its performance determined with e , π , K , p , including negatively charged particles by switching the polarity of the magnet.
4. New **heavy gas Cherenkov counters** (necessary for $e-\pi$ and $\pi-K$ separation) were tuned. The gas system with recirculation and cleaning of C_4F_{10} worked as expected.
5. The mechanically modified (for implementing the heavy gas Cherenkov counters) **Nitrogen Cherenkov counters** worked as expected.
6. New **pre-shower detectors** were tuned and calibrated with pions and electrons.
7. The **triggers** were set-up such as to tag $\pi\pi$ and πK simultaneously.
8. The **Micro drift chambers** were installed by the end of the run and operated successfully with new electronics and preamplifiers.
9. **DAQ status:** Upgrading and tuning hardware and operating systems for computers, which are critical for data acquisition system, was done in July-August 2006. Software for handling the new electronic modules was optimized for in-beam operation. The revised software for automatic and interactive on-line monitoring of data was adjusted to running conditions.

Data taking:

Altogether we recorded 1.6 billion triggers. Provided FRITIOF-6 simulations are correct we expect about 700 πK atoms, most of which will show up in the πK Q-distributions as a sharp peak.

Analysis:

1. The **description of the magnetic field** has been modified in order to account for the larger momentum acceptance.
2. The **DIRAC GEANT** package has been changed according to the new set-up
3. The **DIRAC ARIANE analysis package including the detector simulations** was modified for the new data.

The software thus is almost ready for reconstructing $\pi\pi$ and πK Q-distributions. In parallel we continued to work on the analysis of old data, especially on a better understanding of systematic errors.