MAMBO

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1 Introduction

MAMBO groups together two complementary INFN activities in Germany, both aimed at studying the excited spectrum of the nucleon: the experimental program with the MAMI-C microtron in Mainz and the BGO-OD experiment at Bonn-ELSA. LNF are involved in the latter activitiy.

2 BGOOD experiment

The BGOOD esperiment is performed in collaboration between INFN sections of Roma2, LNF, Messina, Pavia, ISS-Roma1 and Torino, the University of Bonn, Physikalisches Institut, ELSA department, the University of Bonn, Helmholtz Institut für Strahlen- und Kernphysik, the University of Edinburgh, the National Science Center Kharkov Institute of Physics and Technology, the University of Moscow, Russia, the Petersburg Nuclear Physics Institute (PNPI), Gatchina, the Idaho State University and the University of Basel. More that 70 physicists participate to this experimental program foreseen to last until 2020 with possible extention.

The INFN instrumental contribution consist in the *Rugby Ball* calorimeter and associated detectors previously used at GRAAL, the target system, the cylindrical tracking chambers and the MRPC detector. In the collaboration managment, LNF expresses the co-spokesperson and one of the experiments to be performed as advised by the joint MAMI-ELSA PAC is leaded by LNF as well (η' photoproduction near threshold).

3 Activity in 2017

During 2017 the BGO-OD entered the production period. The ELSA planning allowed for two periods of data taking. One short beam time in February was used to perform the final commissioning of the detector while during a three weeks data taking beam time in April-May useful data for η and η' photoproduction off the proton were collected. Data for strangeness photoproduction measurements were collected as well. This was the first period of a long campaign with the aim of obtaining a precise measurement of the beam asymmetry close to the threshold exploiting the energy resolution ($\Delta E_\gamma \sim 5MeV$) of the photon spectrum in the region of the polarised peak.

The experiment is now routinely capable of producing a photon beam of intensity $3 \cdot 10^7 s^{-1}$ very close to the design value of $5 \cdot 10^7 s^{-1}$. The beam can be polarised *via* the technique of the coherent *Bremsstrahlung*. around 1.5 GeV, the region of major interest, a degree of linear polarisation ~ 0.4 was obtained. The alignement of the diamond crystal with the electron beam is performed with the *Stonehenge* technique, and the degree of polarization is continously monitored.

Data analysis was started for many different final state channels. The abundant π^0 photoproduction was used to check the control of the beam polarisation which resultad to be excellent. In Figure 1 we show an example of the beam asymmetry measured at BGO-OD (one week beam

time) compared to the existing GrAAL data. The excellent agreement is a clear indication of the good control of the beam polarisation.

The beam polarisation is rotated every 5 minutes by 90^o and the beam asymmetry can be extracted from both photon polarisation states. In Figure 2 we show the comparison of the beam asymmetry obtained from the two polarisation directions. The agreement is excellent.

The target system underwent a complete maintenance after six years and the target cell was changed from a 6 cm lenght to 11 cm lenght. This will allow to halve the data taking necessary for any reaction. The time needed to liquify Hydrogen is $\simeq 9hr$ (see Figure 3)

4 Planned activity in 2018

The ELSA schedule and the concurrence of the CB-ELSA experiment and test beam measurements for high energy experiments will allow for two periods of data taking, each lasting three weeks. One data taking period of 21 days is scheduled in 2018 in June-July and a second period is expected to take place in September/October 2018.

Data analisys will continue for η and η' photoproduction channels close to the η' threshold.

The technical paper of the BGO-OD experiment is under preparation and will be completed in the next months.

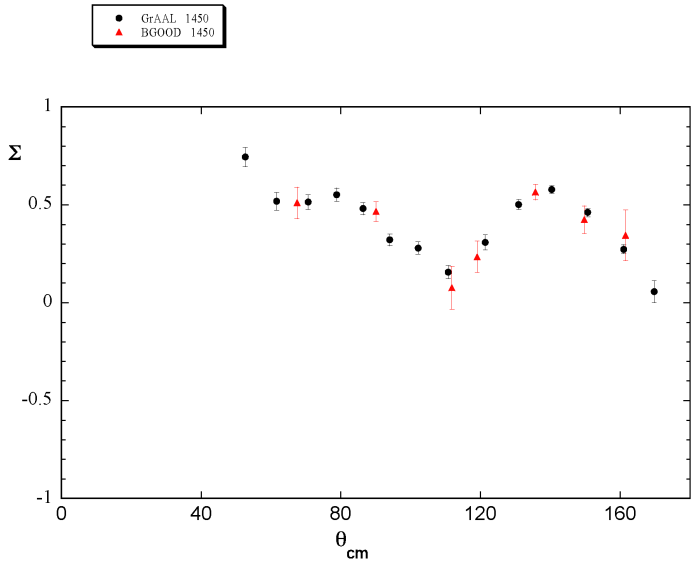

Figure 1: *Comparison of the beam asymmetry for π^0 photoproduction obtained at BGO-OD with the previous existing data from GrAAL at E_γ=1450 MeV incident photon energy.*

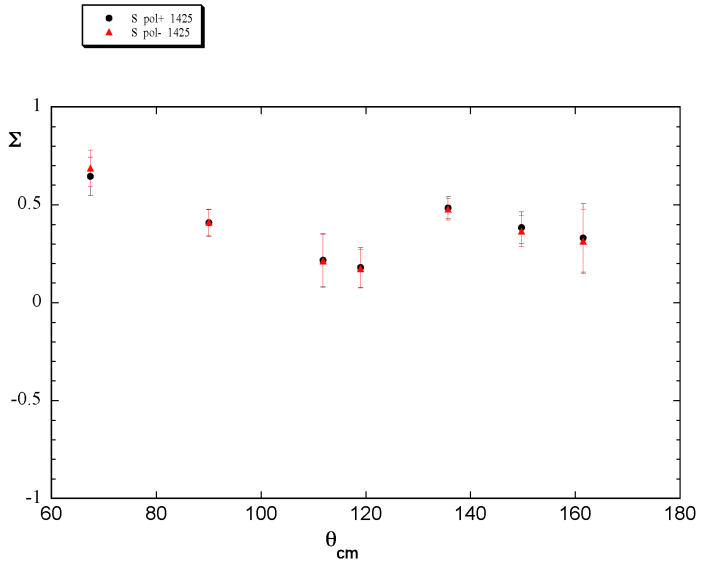

Figure 2: *Comparison of the beam asymmetry for π^0 photoproduction at E_γ=1425 MeV obtained at BGO-OD from the two perpendicular polarization states.*

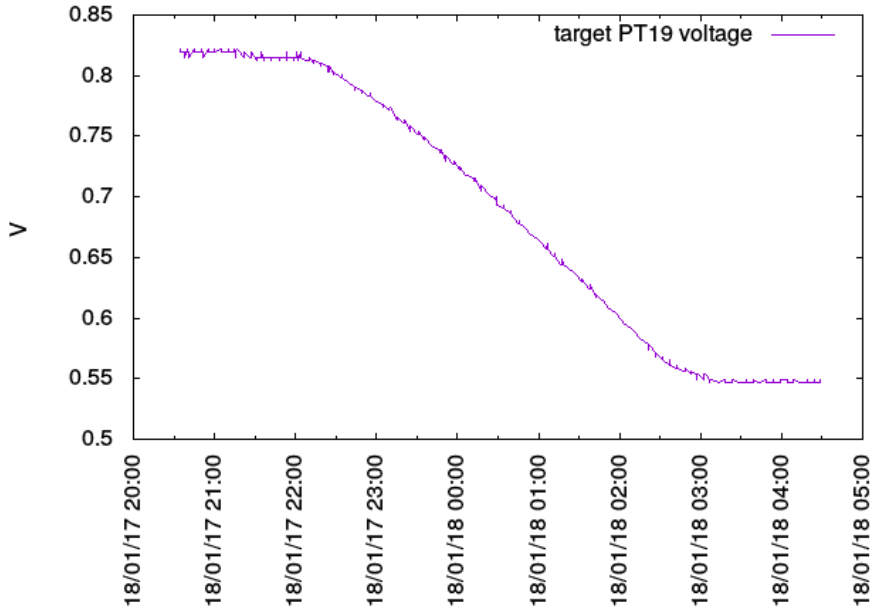

Figure 3: *Liquefaction time in the new 11 cm cell.*