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 new BGO-OD experiment at Bonn-ELSA. LNF are involved in the last 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 and the University of Basel. More that 70 physicists participate to this experimental program foreseen to last until 2017 with possible extention. Idaho State University has joined the collaboration in 2014.

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 ($\eta\prime$ photoproduction near threshold).

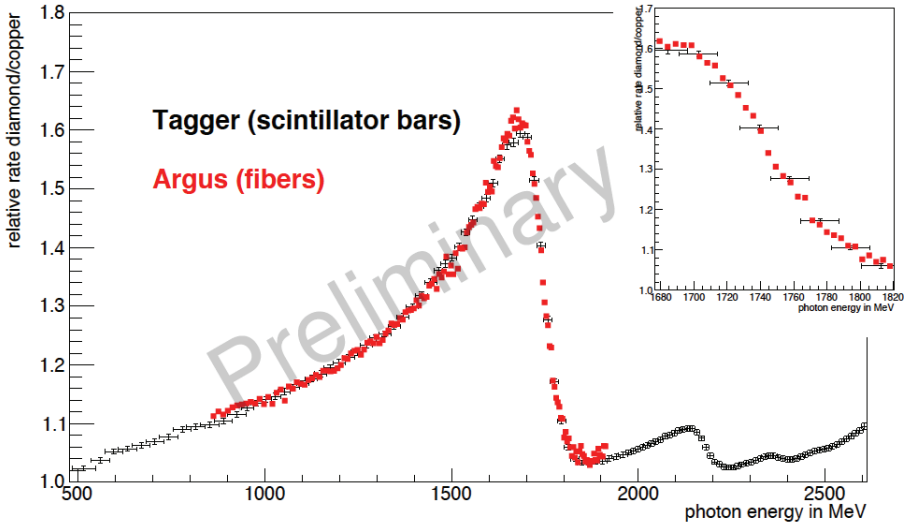

Figure 1: *Photon energy spectrum as measured by the tagger (black) and by ARGUS (red)*

3 Activity in 2015

During 2015 the detector was fully assembled and is now in its final configuration. The photon beam was optimised and the tagging system was complemented with tha ARGUS fibre detector that allows for a precise measurement ($\Delta E_\gamma \sim 5MeV$) 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 (see Fig. 1).

The BGO *Rugby Ball* calorimeter, now equipped with sampling ADC's, was calibrated by using 22Na sources and the calibration obtained at low energy was demonstrated to be usable in the GeV range. Moreover, the possibility od detecting particles with different arrival times allows to use the calorimeter as a k^+ detector by measuring the decay products of the stopped kaon. The barrel detector was calibrated as well and the necessary PID in the central region was obtained.

The MRPC and MWPC detectors were installed at the end of the year and their commissioning was started (see Fig. 2)

Two production runs were performed in 2015 still with a reduced detector configuration. The first, with coherent peak positioned at $E_\gamma \sim 1.55GeV$ has collected 6 TB of data. In the second run the coherent peak was set at $E_\gamma \sim 1.80GeV$ and 11 Tb of data were collected. Both were performed with liquind hydrogen target. Also a short run with carbon tagert was performed. The data analysis was started and signals for all the searched channels were obtained.

During 2015 also the data analysis on the former GrAAL experiment was continued in parallel with BGOOD and three papers were produced.

4 Planned activity in 2016

MRPC and MWPC detectors will be commissioned before June 2016 and an intense data taking period is foreseen before the end of the year, with hydrogen target: 9 weeks of data taking have been scheduled with different coherent edge settings. The liquid deuterium target will be used in a later period, maybe at the end of 2017. Within this year we expect to collect the necessary data to complete the experimental program approved by the PAC for the hydrogen target. The analysis of the GrAAL data for $\eta\prime$ photoproduction will also be continued and the differential and total cross sections will be obtained.

5 publications

P. Levi Sandri et al. Eur. Phys. J. A51, 77 (2015).
V. Nedorezov et al. Nucl. Phys. A94, 264 (2015).
V. Vegna et al. Phys. Rev. C91, 065207 (2015).

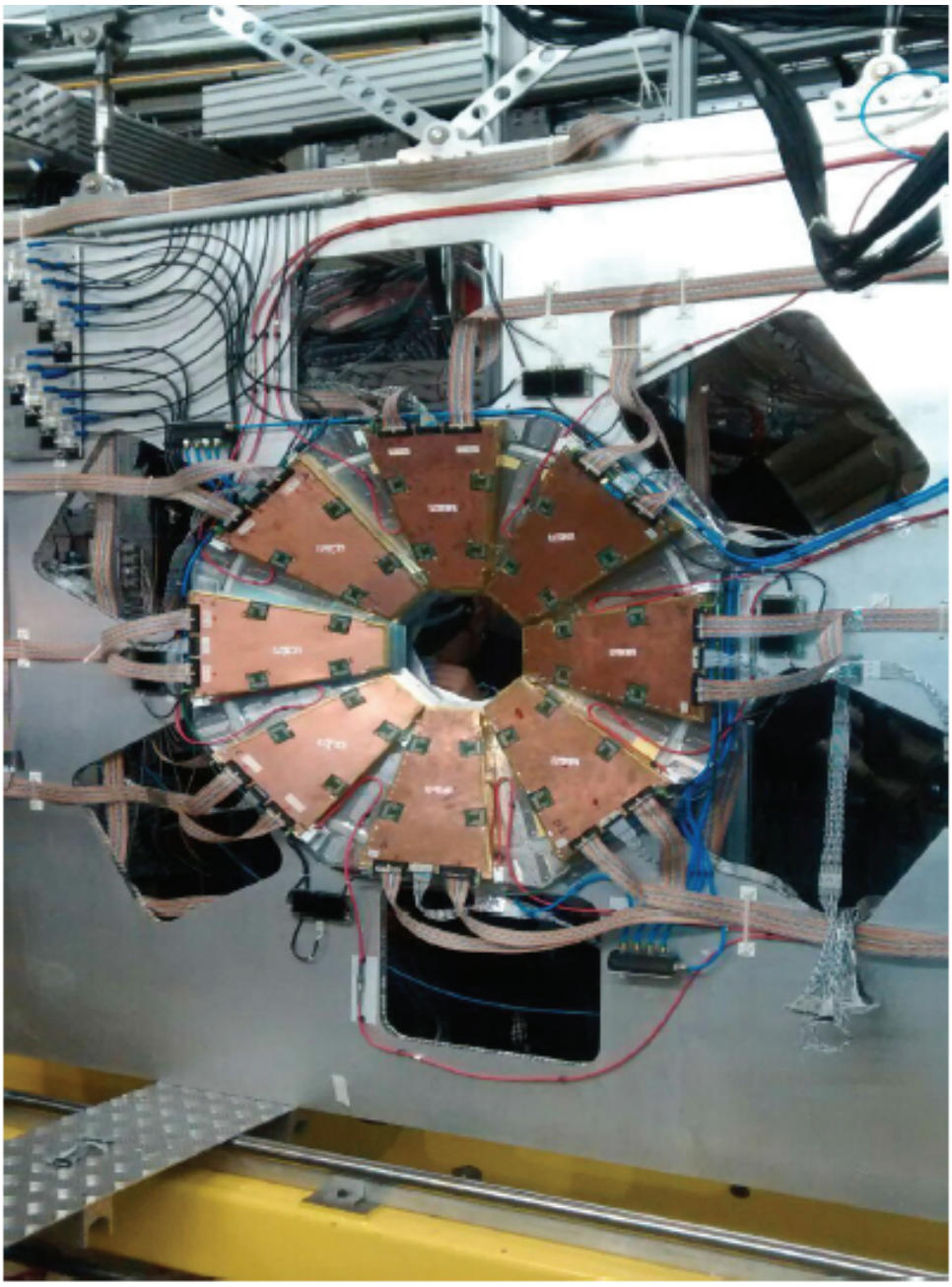

Figure 2: *The MRPC detector installed at BGOOD (nov.2015)*