

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 A2 with the MAMI-C microtron in Mainz and the BGOOD experiment at Bonn-ELSA. LNF are involved in the latter activity.

2 BGOOD experiment

The BGOOD experiment is performed in collaboration between INFN sections of Roma2, LNF, Pavia, ISS-Roma1, the University of Messina, the University of Bonn, Physikalisches Institut, ELSA department, the University of Bonn, Helmholtz Institut für Strahlen- und Kernphysik, the University of Edinburgh, the Institute for Nuclear Research (INR) Moscow, the University of Moscow, the Petersburg Nuclear Physics Institute (PNPI), Gatchina, the Institute for Nuclear Research of NASU Kyiv, and the Lamar University. More than 70 physicists participate to this experimental program foreseen to last until 2024 with possible extension.

The INFN instrumental contribution consists 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 management, LNF expresses the co-spokesperson and one of the experiments to be performed as advised by the joint MAMI-ELSA PAC is led by LNF as well (η' photoproduction near threshold).

3 Activity in 2021

The pandemic from SARS-COV-2 has stopped all the experimental activities at ELSA until September. The beam was delivered to BGOOD during three weeks in November 2021 and a Deuterium run was performed with improved beam quality, with the beam spill increased from 10 s to 18 s, and an improved DAQ efficiency, with dead time decreased by 60%.

Data analysis was continued in various channels including Kaon and η photoproduction off the neutron, η' photoproduction off the proton at threshold and the study of the $\Lambda(1405)$ line shape.

A complete new field of research was started after proving the possibility to perform coherent Deuteron photoproduction measurements.

4 Planned activity in 2022

ELSA is expected to continue the normal beam delivery to the experiments in 2022. No particular hardware or upgrade interventions are foreseen for the rest of the year. The collaboration is waiting to resume normal production periods to collect data on D2 target and on H2 target to complete the

necessary statistics. The present situation with a war between Russia and Ukraine prevents the colleagues and friends from both countries to participate to the experiment, with a strong impact in the collaboration. No substantial activity will be possible until the peace is reestablished.

5 Publications

- 1) $\gamma+p \rightarrow K^+ + \Lambda$ Eur. Phys. J. A (2021) 57:80
- 2) $\gamma+p \rightarrow K^+ + \Sigma^0$ Physics Letters B820 (2021) 136559
- 3) $\gamma+n \rightarrow K^0 + \Sigma^0$ arXiv:2108.13319
- 4) $\gamma+p \rightarrow K^+ + \Lambda(1405)$ arXiv:2007.08898
- 5) $\gamma+d \rightarrow \pi^0 + \pi^0 + d$ arXiv:2202.08594