Study of a 3x3 module array of the ECAL0 calorimeter with an electron beam at the ELSA

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ECAL0 is a new electromagnetic calorimeter designed for studying generalized parton distributions at the COMPASS II experiment at CERN. The calorimeter will be located next to the target, right after the recoil proton detector and will cover larger photon angles (up to 30 degrees). It is of a modular design – each module is a high-granularity Shashlyk device. The total number of individual channels is approx. 1700. The readout is based on wavelength shifting fibers and micropixel avalanche photodiodes.

Characterization of the calorimeter includes tests of particular sub-components (like photodetectors), tests of complete modules and module arrays, as well as a pilot run of a fully-functional, quarter-size prototype in the COMPASS experiment. Up to now, the following calibrations were performed: cosmics tests, muons and $\pi^0$.

The main goals of the tests on low-intensity electron beam at the ELSA accelerator in Bonn were:

- to provide energy calibration using electrons,
- to measure angular response of the calorimeter,
- to perform additional checks - measure light attenuation of the WLS fibers after assembly in the module and perform an energy scan to cross-check previously collected data.

A dedicated measurement setup was prepared for the tests, including a 3x3 array of the ECAL0 modules, a scintillating-fiber hodoscope and a remotely-controlled motorized movable platform. The measurements were performed using three electron energies: 3.2 GeV, 1.6 GeV and 0.8 GeV. They include a calibration of the whole detector array with a straight beam, multiple angular scans (0 to 36 degrees with a 6 deg. step), and a lateral scan to provide information on attenuation of the WLS fibers.

Both measurement setup and the program of the tests will be shown, followed by presentation of the results and plans for further detector tests and possible improvements.

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References
3. I.Chirikov-Zorin, Z.Krumshtein, A. Olchevski, V. Utkin, P. Zhmurin, the design of a module of a new electromagnetic calorimeter for COMPASS II, presented on SPIN-Praha-2013, July 7 2013, Prague, Czech Republic
5. COMPASS-II Proposal CERN-SPSC-2010-014 SPSC-P-340 (2010)