Development of Detectors and New Experimental Techniques*

Especially in the fields of nuclear- and particle physics, but also in the applied physics or material science new experiments are frequently triggered by new technologies becoming available. On the other hand modern experiments often require more sensitive, faster or higher resolution detector concepts not commercially available. These developments typically start with small scale prototypes which have to be tested under different experimental conditions to improve on the design and performance. This is usually an iterative process to optimize the parameters from the basic idea to a specialized dedicated application. Here the MLL Tandem accelerator facility offers unique and versatile experimental options to test such technological developments with protons, ion beams, gamma rays or even mono energetic neutrons from nuclear reactions. Many of these developments which have been already included in other experiments are described in the corresponding sections. Very recent or versatile developments that can be applied in different fields are introduced in this section. This covers a wide range of different fields from special arrangements of highly segmented silicon detectors for the MINBALL experiment at CERN, ultra fast gas detectors for CERN and GSI Darmstadt, the study of scintillation properties of new inorganic materials, special detector arrangements to identify super heavy elements, micro slits to cut down ion beam diameters at extremely high intensities for the SNAKE microprobe at the MLL, special digital data acquisition techniques developed for the R3B Experiment at FAIR or extremely large ultra thin Carbon foils used for experiments with antiprotons or time of flight detectors.

Beside the scientific progress founded on such new technological developments which would be impossible without experiments under realistic conditions, also young academics profit a lot from their practical work and experience gained in this interdisciplinary field.

In the framework of the reported research activities many thesis projects have been successfully completed.

Bachelor Thesis

[1] Ch. Pfeffer, Neuartige Phoswich Szintillationsdetektoren zum Teilchennachweis, BSc thesis, Technische Universität München (2013).

[2] M. Kaeppel, Lichtemission aus flüssigem Xenon, BSc thesis, Technische Universität München (2013).

[3] Ch. Berner, Nukleare X-ray-Emission in der Massenregion um A = 100, BSc thesis, Technische Universität München (2013).

[4] Ch. Schwarz, Optimierung der Lichtsammlung in flüssigem Xenon, BSc thesis, Technische Universität München (2013).

[5] Ch. Gack, Untersuchung des Zwei-Neutronen-Transfers mit MINIBALL und ^{7}Li-Targets, BSc thesis, Technische Universität München (2013).

[6] M. Pleitinger, Gammaspektroskopie mit MINIBALL und der symmetrischen Kernreaktion mit ^{7}Li- Strahl, BSc thesis, Technische Universität München (2013).

[7] Ph. Louis, Entwicklung eines Kühlsystems für einen Silizium-Detektor, BSc thesis, Technische Universität München (2013).

[8] A. Mathis, Test eines IROC-GEM-Prototypen mit niederenergetischen Protonen, BSc thesis, Technische Universität München (2013).

[9] I. Homm, Time and energy resolution of a LaBr3(Ce) scintillator coupled to SiAPDs, BSc thesis, Technische Universität Darmstadt (2013)

[10] Ch. Suerder - "Study of the permormance of fast LaBr3(Ce) and CeBr3 scintillation crystals using various readout configurations" BSc thesis, Technische Universität Darmstadt (2013)

[11] T. Stettner, Messaufbau zur Charakterisierung von Silizium-Avalanche-Photodioden für das CALIFA-Kalorimeter, BSc thesis, Technische Universität München (2012).

[12] S. Maurus, Development of a TEGIC-Detector for Heavy Ions, BSc thesis, Technische Universität München (2012).

[13] Ch. Mayr, Kalibrierung einer Lichtquelle für einzelne Photonen im Vakuum-Ultraviolett, BSc thesis, Technische Universität München (2012).

[14] T. Widmann, Schichtdickenmessung organischer Schnittbilder, BSc thesis, Technische Universität München (2012).

[15] J. Wirth, Entwicklung eines Kühlsystems für einen Silizium-Teilchen-Detektor, BSc thesis, Technische Universität München (2012).

[16] M. Dierigl, Aufbau und Charakterisierung von Prototyp-Detektoren für das CALIFA-Kalorimeter, BSc thesis, Technische Universität München (2011).

[17] R. Salentin, Ein digitales Triggersystem für das Miniball-Experiment, BSc thesis, Technische Universität München (2011).

[18] K. Schmidt-Sommerfeld, A new controller for the HADES RICH gas supply system, BSc thesis, Technische Universität München (2011).

Diploma and Master Thesis

[1] S. Reichert, Untersuchung der Multiplizität charakteristischer Röntgenstrahlung nach Fusionsprozessen schwerer Kerne mit dem MINIBALL Spektrometer, Master thesis, Technische Universität München (2013)

[2] H. Schmeiduch, Eine Methode zur Messung magnetischer Momente von Atomkernen im fs-Bereich, Diploma thesis, Technische Universität München (2012)

[3] S. Klupp, A Calibration Experiment for the AGATA Pulse Shape Analysis, Diploma thesis, Technische Universität München (2011)

[4] M. Winkel, Implementierung und Erprobung einer digitalen Pulsformanalyse zur Auslese von Kalorimetern, Diploma thesis, Technische Universität München (2011)

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