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First Experimental Campaigns at FAIR: Heavy Ion Tracker Systems Based on Scintillating Fibres

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Nuclear reactions have been a powerful tool to study and understand the fundamental properties of nuclei, as well as the governing nuclear force. This is possible due to nuclear and particle detectors that have been developed and adapted to correctly and as completely as possible characterize the nuclear reactions under study. They can provide useful information such as particle position and energy, among others, depending on their intrinsic characteristics. One of these detectors, commonly used in the characterisation of nuclear reactions at very high energies (relativistic energies) are scintillation fibres, which are the main topic of this dissertation.

The aim of this work is to investigate the response, performance and properties of scintillating fibres used as tracker detection systems for heavy ions at relativistic energies, taking as reference the R3B experiment. The properties of the fibres will be studied, such as the geometry and the impact of coating fibres with aluminium to avoid crosstalk between fibres. Thus, study the impact of the final detection efficiency and position resolution in the detector.

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