Rutherford Backscattering Spectrometry system in channeling regime

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This contribution deals with Rutherford Backscattering Spectrometry in channeling regime (RBS/C) which is an ion beam analysis for near surface layers of solids. The experiment is most often carried out using He^+ ions at energy typically around 2 MeV. The sample holder is attached a 4D goniometer. Channeling of high energy ions can be used to analyze the crystalline quality of the lattice, i.e. lattice disorder, substitutional or interstitial atom impurities present in the lattice etc. As the channelling experiment is preceded by at least 160 RBS spectra measurements, the manual preparation of hundreds of scripts, as well as manual evaluation of measured data is complex and time consuming. Hence, the automatization of this process is required in order to increase the efficiency [1].

The standard experimental set up for ion beam analysis (IBA) at ion beam laboratory in STU does not provide straightforward way for channeling spectra measurement [2].The 6 MV Tandetron which includes IBA system is computer operated and enables to run RBS measurements via the several successive scripts (batches). The control software written in MATLAB contains the preset parameters of the measurement and enables collecting of the measured data.

An example of channeling measurement prepared and evaluated by the software will be presented.

[1] M. Mayer, Rutherford Backscattering Spectrometry (RBS), (2003) 59 – 78.

[2] L. S. Sjöbom. Channeling od MeV ion beams: Improving sample alignment at the tandem accelerator, Ångström laboratory, (2014).