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HAPG mosaic crystal Von Hamos spectrometer for high precision exotic atoms spectroscopy

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Von Hamos spectrometers are widely used in several fields, ranging from pure physics applications to very different types of practical ones. However, these type of Bragg spectrometers are usally implied in high rate –high resolution experiments, where the typical source size can be as low as few tens of microns. These limitations prevented them to be used as X-ray detectors for high precision exotic atoms spectroscopy. Recently, the VOXES collaboration at the INFN Laboratories of Frascati INFN recently developed a VH spectrometer, making use of HAPG mosaic crystals and a X-ray beam optics optimization, which could be used for source sizes up to few mm, (in the Bragg plane), some tens of mm in the sagittal plane and, if gaseous sources are used, of several tens of cm in the X-ray propagation direction. Such kind of a spectrometer could be used, for example, to open a new era in the field of exotic (kaonic) atoms precision measurements, delivering data with unprecedented precision to the (strangeness) nuclear physics community. In order to foreseen the possible capabilities of this apparatus in terms of signal collection efficiency, reliable ray tracing simulations are necessary, whose consistency with experimental data has to be preliminary checked. We present the main results obtained with the VOXES spectrometer, as well as a comparison of ray tracing simulations. For both of resolutions and reflection efficiencies, the simulations and the experimental results are found to be well in agreement within the errors.

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