

X-ray spectropolarimeters and their application to Z-pinches

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X-ray spectroscopy is a powerful tool to study high temperature plasma which is effective source of He-like lines. There are number of models to describe intensities of He-like group so that comparison of experimental spectra with calculated one permits to extract plasma parameters. Models are not so trivial since pinch plasma is well known of it's electron beam generated at the latter stage of the discharge. It means that time dependent modeling of spectra is required. Other effects should be taken into account in accurate way are: optical density, presence of electromagnetic fields, collisional exchange between levels, etc. Experiments carried out on Z-pinches have shown, that He-like lines are polarized. The reason for polarization are the presence of electromagnetic fields and/or electron beams. Today the general recommendation is: first to analyze the degree of polarization of lines used for diagnostics, then chose the model to be used for their analysis. Study of polarized emission of pulsed plasma is important to get information on the physical processes in plasma, on the application ranges of conventional diagnostics approaches, it open perspectives to create new type of diagnostics. X-Ray polarization analysis is based on the diffraction properties of crystals, where the integral reflection coefficient of ideal crystal testifies, that at Bragg angle equal to 45 degrees only sigma component is reflected and crystal serves as polarizer. Polarimeter is a device, which separates two mutually perpendicular polarizations. Polarization analysis of pulsed irreproducible x-ray sources is usually carried out with two identical polarizers or with single crystal polarimeter. This paper describes the design of two types of spectropolarimeters, which are intended to diagnose polarization of X-ray lines. The example of their application is also presented.