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The New On-Line Photoionization Spectrometer at FLASH PAVLE JURANIC, DESY, MICHAEL MARTINS, LORENZ JAHN, University of Hamburg, Germany, SUSANNE BONFIGT, DESY, STEPHAN KLUMMP, University of Hamburg, Germany, JENS VIEFHAUS, KAI TIEDTKE, DESY — Due to the stochastic nature of the SASE process and the resulting pulse-to-pulse fluctuations of the Free-electron Laser (FEL) photons, the experimenters require the knowledge of the properties of the beam they're working with. In particular, the experimenter who is investigating narrow atomic or molecular resonances, phase transitions, or any other kind of effect heavily dependent on the photon energy of an FEL would need to know the precise photon energy of each individual photon bunch. Real-time photon energy measurement could also be used by the operators of the FEL machine to tune the beam. Also, whatever spectrometer used must not interfere with the beam so significantly to cause the experiment to receive substantially less light, degrading the quality the beam's wavefront, coherence, pulse length, and other properties. The group at the Free Electron Laser in Hamburg (FLASH) has developed an on-line photoionization spectrometer that uses electron and ion time of flight (TOF) spectrometers and gases as a way to measure the photon pulse energy. By measuring the out-of-focus-beam electron kinetic energy spectra, and by looking at the relative ion signal photoionization ratios of already known noble gases, one can determine the photon energy of the FEL beam.

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