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Design of tangential multi-energy soft x-ray camera for NSTX-U LUIS F. DELGADO-APARICIO, J. MADDOX, N. PABLANT, K. HILL, M. BITTER, B. STRATTON, PHILLIP EFTHIMION, Princeton Plasma Physics Laboratory — For tokamaks and future facilities to operate safely in a high-pressure long-pulse discharge, it is imperative to address key issues associated with impurity sources, core transport and high-Z impurity accumulation. Multi-energy SXR imaging provides a unique opportunity for measuring, simultaneously, a variety of important plasma properties (T_e, n_Z and ΔZ_{eff}). A new tangential multi-energy soft x-ray pin-hole camera is being design to sample the continuum- and line-emission from low-, medium- and high-Z impurities. This new x-ray diagnostic will be installed on an equatorial midplane port of NSTX-U tokamak and will measure the radial structure of the photon emissivity with a radial resolution below 1 cm at a 500 Hz frame rate and a photon-energy resolution of 500 eV. The layout and response expected of the new system will be shown for different plasma conditions and impurity concentrations. The effect of toroidal rotation driving poloidal asymmetries in the core radiation is also addressed. This effort is designed to contribute to the near- and long-term highest priority research goals for NSTX-U which will integrate a non-inductive operation at reduced collisionality, long energy-confinement-times and a transition to a divertor solution with metal walls.

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