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6.50 A space-resolved extreme ultraviolet spectrometer for radial profile measurement of tungsten ions in the EAST tokamak

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EAST tokamak has been equipped with upper tungsten divertor since 2014 to improve the heat exhaust capability. In order to study the behavior and radial transport of tungsten ions in long-pulse H-mode plasmas, a space-resolved spectrometer working at 30-570Å is newly developed to measure the tungsten emission profile. Good spectral resolution of $\Delta\lambda_0 = 4\text{-}5$ pixels, sufficient temporal resolution up to 50ms/frame and high spatial resolution of 0.8cm are obtained simultaneously. Absolute intensity calibration is carried out by comparing the bremsstrahlung continuum intensity between EUV and visible ranges. Radial profiles of tungsten emissions from 4p-4s and 4p-4p transitions in W42+ – W45+ ions are successfully obtained at 45-70 Å and 120-140 Å in high-temperature discharges ($T_e > 2.5\text{keV}$), e.g. W43+ at 61.334Å, W44+ at 60.93Å, W45+ at 62.336 Å, W42+ at 129.41Å, W43+ at 126.29 Å and W45+ at 126.998Å. Radial density profiles of W42+ – W45+ ions are analyzed with measured Te and ne profiles and photon emissivity coefficient (PEC) from ADAS database.

Primary author(s) : ZHANG, Ling (Institute of Plasma Physics, Chinese Academy of Sciences)

Co-author(s) : MORITA, Shigeru (National Institute for Fusion Science); XU, Zong (Institute of Plasma Physics, Chinese Academy of Sciences); YANG, Xiuda (Institute of Plasma Physics, Chinese Academy of Sciences); ZHANG, Pengfei (Institute of Plasma Physics, Chinese Academy of Sciences); CHEN, Yingjie (Institute of Plasma Physics, Chinese Academy of Sciences); ZANG, Qing (Institute of Plasma Physics, Chinese Academy of Sciences); LIU, Haiqing (Institute of Plasma Physics, Chinese Academy of Sciences); GAO, Wei (Institute of Plasma Physics, Chinese Academy of Sciences); WU, Zhenwei (Institute of Plasma Physics, Chinese Academy of Sciences); CHEN, Junling (Institute of Plasma Physics, Chinese Academy of Sciences); GONG, Xianzu (Institute of Plasma Physics, Chinese Academy of Sciences); HU, Liqun (Institute of Plasma Physics, Chinese Academy of Sciences)

Presenter(s) : ZHANG, Ling (Institute of Plasma Physics, Chinese Academy of Sciences); MORITA, Shigeru (National Institute for Fusion Science); XU, Zong (Institute of Plasma Physics, Chinese Academy of Sciences); YANG, Xiuda (Institute of Plasma Physics, Chinese Academy of Sciences); ZHANG, Pengfei (Institute of Plasma Physics, Chinese Academy of Sciences); CHEN, Yingjie (Institute of Plasma Physics, Chinese Academy of Sciences); ZANG, Qing (Institute of Plasma Physics, Chinese Academy of Sciences); LIU, Haiqing (Institute of Plasma Physics, Chinese Academy of Sciences); GAO, Wei (Institute of Plasma Physics, Chinese Academy of Sciences); WU, Zhenwei (Institute of Plasma Physics, Chinese Academy of Sciences); CHEN, Junling (Institute of Plasma Physics, Chinese Academy of Sciences); GONG, Xianzu (Institute of Plasma Physics, Chinese Academy of Sciences); HU, Liqun (Institute of Plasma Physics, Chinese Academy of Sciences)

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