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Anomalous He-like ion resonance-to-intercombination line intensity ratios in discharge and laser produced plasmas.[1] VYACHESLAV SHLYAPTSEV, Colorado State University, G. AVARIA, Comisin Chilena de Energa Nuclear, Santiago, Chile and Center for Research and Applications in Plasma Physics and Pulsed Power, J. LI, Colorado State University, F.G. TOMASEL, Advanced Energy Industries, Fort Collins, CO 80525, USA, M. BUSQUET, M. KLAPISH, ARTEP Inc., Ellicott City, MD 21042, A.YA. FAENOV, Institute for Academic Initiatives, Osaka University, Suita, Osaka 565-0871, Japan, J.J. ROCCA, Colorado State University, CSU TEAM, ARTEP TEAM, OSAKA UNIVERSITY TEAM — Highly anomalous resonance-to-intercombination line intensity ratios were observed in He-like ions spectra from plasmas created in high current density microcapillary channels by ultrafast current pulses ($\leq$ 4ns risetime). The emission from discharges containing Si or Al impurities show intercombination line intensities to exceed the resonance line intensities by nearly an order of magnitude. The analysis and detailed hydrodynamic/atomic physics model simulations suggest that the effect responsible for the spectral anomaly reported here is different from those observed to cause similar abnormalities in other plasmas, and is related instead to a new phenomenon in which the very different optical depths in the transverse and axial directions generate triplet level populations greatly exceeding the singlet state populations. The modeling suggests that for different experimental conditions there could be even much larger line ratios observed. The model predictions were tested in wide range parameters and methods of plasma creation including laser produced plasma.

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