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Line Integrated Barium Absorption Spectroscopy For Hollow Cathodes[1] NATHANIEL WIRGAU, JOHN FOSTER, Univ of Michigan - Ann Arbor — The lifetime of the HCA in many cases determines the overall lifetime of the thruster. The lifetime of cathodes is dependent upon the state of the emitter surface, characterized by a mean work function. Due to various processes including depletion of emitter material, the work function of the emitter tends to increase over time, ultimately ending in emitter failure at practical emission temperatures. Future thrusters will require higher emission currents from their HCA than the currently attainable. Physics based simulation of HCA operation have the potential as a tool to understand both the uncertainty and sensitivity of life-limiting processes. Howerver, the physics within the model must be verified and then the model benchmarked against simple cases. The model must also be tested against experiment for predictive validation. In this work, we gain insight into the evolution of the barium supply within the insert region of an HCA. Through the use of absorption spectroscopy and given that barium density is high enough to adequately discriminate signal from noise, we obtain a line-integrated measure of the neutral barium density during cathode operation as a first step towards quantifying barium transport in the insert region. Here we present the progress of this work.

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Nathaniel Wirgau
Univ of Michigan - Ann Arbor

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