

Abstract Submitted  
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**Injection of a Neutral Hydrogen and Helium Beam through Plasma** TERESA BARTAL<sup>1</sup>, Goshen College, ELIZABETH FOLEY, Nova Photonics Inc., FRED LEVINTON, Nova Photonics Inc. — A code is presented for a diagnostic neutral helium beam injected through plasma. Through a set of coupled differential rate equations, the code calculates the population fraction of the atoms in eleven different energy states as the beam propagates through the plasma. The differential equations include the effects of ionization, collisional excitation and de-excitation, charge exchange and spontaneous radiation emission as well as laser-induced excitation for the atoms in the helium beam. Through numerical analysis the effects of beam energy and plasma density and temperature on the population fractions of the helium atoms can be observed. Simulations were performed with uniform plasma parameters and certain profiles. A similar code is being developed for a neutral hydrogen beam propagating through plasma in a magnetic field. The code will calculate the population fractions in the  $n=1, n=2$  and  $n=3$  sublevels as their parameters vary with background magnetic and electric fields. This work is being done in support of motional stark effect diagnostic development.

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