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Enhanced Output of the High Power Helicon with Addition of a Downstream Accelerating Antenna B. RACE ROBERSON, ROBERT WINGLEE, University of Washington, ADVANCED PROPULSION LAB TEAM — The high power helicon (HPH) is a compact plasma source that can generate downstream densities of 10^{17}-10^{18} m^{-3} and directed ion energies of 50-70 eV that continue to increase tens of centimeters downstream of the source. Previous results indicated a diamagnetic perturbation more than 15 gauss in strength that propagates tens of centimeters downstream and cancels out the base magnetic field on axis. This was correlated with the helicon wave being driven by the antenna and indicated an azimuthal current density which peaked at 20 kA m^{-2}. In order to increase the energy coupled into the plasma and drive a larger diamagnetic perturbation a further distance downstream a second, larger radius antenna was added roughly one wavelength downstream co-axially with the first antenna and driven in phase with the first. This resulted in improved collimation of the plasma beam over a meter downstream, increased diamagnetic perturbation, and an increase in the ion energies downstream of more than 20 eV. Ion energy distributions and plasma density measurements will be presented, along with magnetic measurements that suggest enhanced performance of the plasma output.

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