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Hybrid Ion Source Development Project at Los Alamos Neutron Science Center¹ OLLI TARVAINEN, GARY ROULEAU, RODERICH KELLER, MAX LIGHT, TSITSI MADZIWA-NUSSINOV, Los Alamos National Laboratory — The goal of the of the HYBRid Ion Source (HYBRIS) development project at Los Alamos Neutron Science Center (LANSCE) is to design and test a helicon plasma generator assisted high-current-density H^- ion source. The hybrid ion source is a combination of a long-life plasma cathode, sustained by the helicon plasma generator, with a stationary, pulsed main discharge (H^- production chamber) directly coupled to each other. The electrons generated in the helicon plasma are transferred to the multi-cusp chamber by ambipolar diffusion igniting the main discharge. The first Langmuir-probe measurement results describing the plasma properties of the helicon discharge will be presented together with the design of the multi-cusp H^- production chamber. The strength of the magnetic multi-cusp field confining the plasma in the H^- production chamber can be adjusted with the aid of small iron bars. Simulation results illustrating the effect of this special technique on the cusp-field strength will be presented. Also the physical processes affecting the coupling of helicon plasma generator with the primary discharge chamber and the effects of the multi-cusp field strength on plasma confinement will be discussed.

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