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Plasma Species Mix Diagnostic Using Hybrid Layer Reflectometry[1] G.W. WATSON, W.W. HEIDBRINK, University of California, Irvine, G.J. KRAMER, Princeton University, D.G. WHYTE, UCSD — A heterodyne reflectometer could provide a direct and inexpensive measurement of ion species mixes with different charge to mass ratios. Using the cold plasma dispersion relation for multiple ion species, the ion-ion hybrid cutoff frequency is uniquely determined by the density ratio and cyclotron frequencies of those two species. The phase of a ∼20 MHz wave that travels from the launching point to the cutoff layer to the receiving antenna provides a direct measure of the hydrogen:deuterium species mix. In a recent hydrogen puffing experiment the wave was launched from the high field side of the DIII-D tokamak. Preliminary results show agreement with the deuterium density inferred from the increase in the neutron rate during a short beam pulse and from the H_α:$D_?$ light ratio. Results indicate that a wave launched from the high field side can tunnel through the resonance layer and be reflected back to the receiving antenna.

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W.W. Heidbrink
watson@fusion.gat.com
University of California - Irvine

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