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**Transport of helium as an impurity and as a main ion in Alcator C-Mod** KEN LIAO, WILLIAM ROWAN, IGOR BESPAMYATNOV, WENDELL HORTON, XIANGRONG FU, University of Texas at Austin, Institute for Fusion Studies, UNIVERSITY OF TEXAS AT AUSTIN, INSTITUTE FOR FUSION STUDIES TEAM — Local density, temperature, and flow velocity measurements of helium impurity and helium main ion are provided by Charge Exchange Recombination Spectroscopy (CXRS), using a 50keV diagnostic neutral beam. Spectra around the 4686ÅHe II line are collected in 30 optical channels which cover the low field side from the core to the edge. Measurements have been taken in L and H modes, and for helium as an impurity and as the main ion. Helium impurity transport experiments have been conducted by puffing helium during the flat top region of diverse plasma conditions. The transport is assumed to take the form $\frac{dn}{dt} = \frac{d}{dr}(-D\frac{d}{dr}+vn)$, with the source term negligible in the core of the plasma. Estimates of the transport coefficients D and v (assumed to be constant with respect to time) are obtained by fitting the temporal evolution of the helium density profile. For typical L-mode plasma, the helium density confinement peaking factor is 0.7 (hollow). The sensitivities of the logarithmic density gradient to magnetic shear and to temperature scale length will be discussed and compared to predictions of neoclassical theory (NCLASS) and analytical treatment of drift wave turbulence.

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