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**Radially localized helicon mode in helicon plasma sources.** GUANGYE CHEN, CHARLES LEE, ALEXEY AREFIEV, BORIS BREIZMAN, RAJA LAXMINARAYAN, ROGER BENGTSON, The University of Texas at Austin — It has been widely believed that helicon waves are excited in helicon discharges. However, an important but often underappreciated feature of helicon plasma sources is that the plasma density is typically strongly nonuniform across the confining magnetic field with a peak at the axis. This nonuniformity can create a radial potential well for non-axisymmetric helicons, allowing radially localized helicon (RLH) waves [1]. This work presents theoretical and experimental evidence that the RLH waves play a significant role in a helicon plasma source. The measurements of a plasma response to a secondary low-power rf generator with variable frequency indicate the existence of an eigenmode close to the driving frequency of the main generator. The 2D plasma density profile was measured and then used to calculate the rf field structure for the experimental setup. The calculations confirm that an RLH wave is the eigenmode excited in the experiment. The calculations were performed using a 2D field solver for a single resonant azimuthal harmonic (m=1) under the assumption that the density profile is axisymmetric. 1D field calculations for the measured radial density profile were used to identify the RLH wave by its dispersion relation and to distinguish it from the conventional helicon and Trivelepiece-Gould waves. [1]B. N. Breizman and A. V. Arefiev, Phys. Rev. Lett. 84, 3863 (2000).

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