Abstract Submitted
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Whistler modes with angular momentum[1] REINER STENZEL, MANUEL URRUTIA, Retired — In unbounded plasmas whistler waves with angular momentum are ubiquitous. The field rotation is the salient feature of general helicon modes. It gives rise to new wave-particle interactions. These waves are studied experimentally in a large uniform laboratory plasma. Their helical wave topology is demonstrated by three-dimensional probe measurements of the wave magnetic field. The orbital angular momentum has been measured quantitatively. The helicity density $\mathbf{J} \parallel \mathbf{B}$ has been determined. Helicons have nearly force-free fields. The field lines are writhed and twisted. In general a loop antenna with a perpendicular rf magnetic field excites a "plane parallel" whistler mode of finite transverse dimension. Its field is circularly polarized and rotates, hence is a generalized helicon mode. For oblique propagation the field rotates around the wave vector. On curved ambient field lines new 3D helicon modes are observed. On circular fields whistler modes propagate near the resonance cone angle. Helicons are reflected by strong magnetic field gradients. Near magnetic null points helicons propagate on the separatrix. Helicons can be trapped in an FRC. The observations are relevant to magnetic reconnection and helicon sources.

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