Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

**A New N+ Band of Electromagnetic Ion Cyclotron Waves: Observations and Theory**[1] MUHAMMAD FRAZ BASHIR, RALUCA ILIE, University of Illinois at Urbana-Champaign — The first observational evidence and theoretical modeling of a new N+ band for EMIC waves in multi-ion (He+, O+, N+) hot plasma are provided as a new perspective to distinguish the relevant magnetospheric processes. The past magnetospheric missions such as Dynamic Explorer-1, Geotail and WIND provided observations showing abundances of N+ similar to those of O+. However, the instruments on board of the current missions (e.g. Cluster, Van Allen Probes, MMS) lack the possibility of reliably separate N+ from O+ due to less mass resolution. The wave observations from Van Allen Probes confirm the existence of N+ EMIC waves and also suggest looking for possible ways to improve capabilities of current missions in quantifying the relative contribution of N+ and O+. Theoretical modeling confirms that the presence of N+ leads to a new N+ band and its instability with additional cut-off, crossover, and resonance frequencies, and significantly changes the dispersion properties of other bands of EMIC waves. This new band has the potential to reduce the discrepancy of considering the wave activity close to the oxygen cyclotron frequency ($\Omega$O+) as He+ band.

[1]NSF AGS 1602738, AFOSR YIP award AF FA9550-18-1-0195 and NASA grant 80NSSC17K0015 (Sub MI 3004631577)

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Date submitted: 03 Jul 2019 Electronic form version 1.4