Contribution ID: **38** Type: **Oral**

Energetic Particle-Induced Geodesic Acoustic Modes on DIII-D

Thursday, 9 December 2021 17:10 (20 minutes)

The energetic particle-induced geodesic acoustic mode (EGAM) causes loss of injected beam ions on DIII-D [1, 2]. The EGAM is a global [3] n=0, m=0 predominantly electrostatic mode with typical fundamental frequencies between 20-40 kHz. (n and m are toroidal and poloidal mode numbers.) While EGAMs commonly appear in amplitude bursts, they can be continuous, sweep in frequency, or oscillate in both frequency and amplitude. Additionally, strong modes can have more than one fundamental frequency and often excite higher harmonics.

A database of around 900 shots is compiled using the current ramp phase, or first second, of the discharge. EGAMs are most easily excited by the counter-injected beams; in these plasmas, EGAMs expel counter-circulating fast ions across the loss boundary [2]. EGAMs occur less often during co-injection and virtually never occur in off-axis injection. The EGAM amplitude and frequency is diagnosed using spectrograms from the magnetic probes. During counter beam injection, the mode frequency is found to have the strongest linear correlation with qmin, with a correlation coefficient around -0.702. While the mode amplitude increases with qmin, it initially increases with the pitch angle scattering time at mid-radius until ⊠PAS ˜ 0.3 s and then decreases. In the figure below, a clear boundary for stability is shown within the operating space of qmin and poloidal beta for modes excited by the counter injected beam. The modes tend to be more unstable at higher qmin and lower poloidal beta, with a stronger dependence on qmin. Further investigation of a single discharge characterizes the nonlinear burst cycle. The period between each successive burst is observed to slightly increase as the current increases.

Indico rendering error

```
Could not include image: Cannot read image data. Maybe not an image file?
```

*Work supported by US DOE under DE-FC02-04ER54698 and DE-SC0020337

\1 R. Nazikian et al, PRL 101, 185001 (2008); G.J. Kramer et al, PRL 109, 035003 (2012)
[2] R.K. Fisher et al, NF 52, 123015 (2012)
[3] M.A. Van Zeeland et al, NF 50, 084002 (2010)

Speaker's Affiliation

University of California, Irvine, Irvine

Member State or IGO

United States of America

Primary author: LIN, Daniel (University of California, Irvine)

Co-authors: HEIDBRINK, William W. (University of California Irvine); VAN ZEELAND, Michael (General Atomics); NAZIKIAN, Raffi (Princeton Plasma Physics Laboratory)

Presenter: LIN, Daniel (University of California, Irvine)

Session Classification: Collective Phenomena (Alfven and Low Frequency Modes)

Track Classification: Collective Phenomena