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**Plasma Jet Diagnostic for Runaway Electron Beam-Plasma Interaction**[1] I.N. BOGATU, J.R. THOMPSON, S.A. GALKIN, J.S. KIM, FAR-TECH, Inc., S. BROCKINGTON, A. CASE, S.J. MESSER, F.D. WITHERSPOON, HyperV Technologies Corp. — FAR-TECH's recently developed $C_{60}$/C plasma jet has the potential to rapidly and significantly increase electron density, deep into tokamak plasma, hence to change the 'critical electric field' as well as the runaway electrons (REs) collisional drag, during different phases of REs dynamics. Suitably chosen visible/UV lines emitted by the injected C ions can then be used for line intensity quantitative spectroscopy, allowing the diagnostic of the RE beam-plasma interaction. The $C_{60}$ delivered in $\sim 1$ ms by the prototype plasma jet system, estimated to be $\sim 75$ mg, carries $\sim 4 \times 10^{21}$ C atoms and $\sim 2.4 \times 10^{22}$ electrons, and would lead to an electron density $n_e \sim 2.4 \times 10^{21}$ m$^{-3}$, i.e. $\simeq 60$ times larger than typical DIII-D pre-disruption value ($n_{e0} \approx 4 \times 10^{19}$ m$^{-3}$). While the prototype's $C_{60}$/C plasma jet mass is not sufficient to achieve the Rosenbluth electron density in DIII-D, it delivers a total number of electrons $\sim 5$ times larger than that of the Ar pellet, with the advantage of a much faster response and precisely chosen delivery time. We will present several proposed diagnostic schemes using rapid $C_{60}$/C plasma jet injection capability in different phases of the discharge in DIII-D.

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