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## 1P10 - Unification of thermionic, field and space charge limited emission

*Monday 24 June 2019 13:00 (1h 30m)*

A recent theoretical study unified field emission modeled by Fowler-Nordheim (FN) and space charge limited emissions (SCLE) with and without collisions modeled by Mott-Gurney (MG) and Child-Langmuir (CL), respectively [1]. This study showed the existence of a triple point, where the three asymptotic solutions matched, and the ubiquitous nature of CL at high voltages, even at high pressure [1]. Theoretical work has also connected FN to thermionic emission modeled by the Richardson-Laue-Dushman (RLD) equation using a general thermal-field emission (GTFE) equation [2]. This presentation explores the potential connection of the GTFE with SCLE, particularly the existence of the triple point as GTFE approaches FN. Experimental implications will be discussed.

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1. A. M. Darr, A. M. Loveless, and A. L. Garner, "Unification of field emission and space charge limited emission with collisions," *Appl. Phys. Lett.*, vol. 114, no. 1, 2019, Art. no. 014103.
2. K. L. Jensen, "A tutorial on electron sources," *IEEE Trans. Plasma Sci.*, vol. 46, no. 6, pp. 1881-1899, 2018.

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