Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **3065** Type: **Oral (Non-Student) / Orale (non-étudiant(e))**

# Effect of Metallicity on Ferroelectric Thin Films

*Monday 6 June 2022 13:45 (15 minutes)*

In the past few years, several experiments have demonstrated that cation-substituted SrTiO3 can simultaneously sustain both metallicity and ferroelectricity; however, little is known about how the metallicity influences the ferroelectric state. In thin films, for example, nonmetallic ferroelectrics tend to break up into nanoscale Kittel domains of opposite polarization to alleviate large internal electric fields. In this talk, I will show through a mix of numerical simulations and heuristic arguments that the selective screening of these fields by a free electron gas fundamentally alters the structure of the ferroelectric. In particular, I will show that, as the two-dimensional electron density n2D increases, there is a smooth crossover from Kittel domains to a head-to-head domain wall configuration, and that the head-to-head domain wall is energetically preferable when en2D >~ P0, where e is the electron charge and P0 the polarization amplitude within the domains.

**Authors:** ATKINSON, Bill; CHAPMAN, Kelsey

**Presenter:** ATKINSON, Bill

**Session Classification:** M2-8 Quantum and Strongly Interacting Electron Systems (DCMMP) | Systèmes quantiques d'électrons interagissant fortement (DPMCM)

**Track Classification:** Technical Sessions / Sessions techniques: Condensed Matter and Materials Physics / Physique de la matière condensée et matériaux (DCMMP-DPMCM)