Title: Avant-garde LHC: Inspiring the ATLAS detector to find physics it wasn't designed to find

Abstract: Why hasn't the Large Hadron Collider (LHC) discovered anything beyond the Higgs boson? Because you're thinking about particle physics in the wrong way. The LHC switched on in 2015 at 13 TeV, the highest energy ever used in a collider experiment and the beginning of a decades-long research program. Our first extensive look at this new data, in 2019, reveals impressive agreement with Standard Model expectations and thus far no new particles. And while the large number of searches for new physics using well-defined and highly-optimized detector objects will remain important, the current moment necessitates a shift in mindset toward previously less-emphasized searches for things like long-lived particles, exotic decays of the Higgs boson, and evidence of QCD-like dark sector hadronization. These searches can involve non-standard final states, atypical detector objects, unexpected backgrounds, and significantly customized analysis methods. I will report on some of the non-standard searches I've pursued at the LHC so far and discuss ideas for the near future and the HL-LHC (and beyond), including how the ATLAS Inner Tracker (ITk) upgrade can likely assist such searches. I will also discuss our current efforts to share expertise and knowledge about long-lived particle searches among the LHC experiments and theorists with the LHC LLP Community initiative. Finally, I'll place particle physics in a larger societal context and briefly examine how new ways of framing and discussing high-energy physics with non-specialists can greatly affect the broader impacts of our work.