



FROM PLASMA SCIENCE TO HIGH POWER MICROWAVE ENGINEERING

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In this talk we'll discuss the professional development opportunities offered in the area of High-Power Electromagnetics to specialists in Plasma Science. We'll re-visit some classical applications of these technologies and we'll try to envision the path for delivering future applications from the lab to the field.

In special, we'll explore the challenges in the generation of high power (> 100 MW peak), short duration, narrowband signals in the microwave regime. Nowadays, the only mechanism for the generation of this kind of extreme power, is the use of vacuum microwave sources, for instance Vircators, Klystrons, BWOs, Relativistic Magnetrons, among others. Although the theory explaining the electron beam generation through field emission, plasma expansion and interaction between electron beams and fields is well established, there are still massive challenges in the accurate modeling, simulation, and optimization of compact and efficient sources. On the other hand, there are still gaps in the adoption of current manufacturing techniques such as additive manufacturing, use of metamaterials, and optical sensing. Finally, I'll discuss what I perceive are new business and professional possibilities for young experts in Plasma Physics, in several industrial fields where high-power electromagnetic fields are required.