

Jayakrishnan Appanam Karakkad

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Work Experience

2020-present

US ITER RF Engineer

A key member of the US ITER ICH team working in the areas of EM analysis and design. Other responsibility includes prototype characterization of RF components.

Education

2014-2020

University of Maryland, College Park, USA
Ph.D in Electrical Engineering

GPA: 3.66/4

2012-2014

Cornell University, New York, USA
Master of Science (Research) in Applied Engineering Physics

GPA: 3.55/4

2008-2012

Indian Institute of Technology (IIT), Guwahati, India
Bachelor of Technology (B.Tech) in Engineering Physics

CPI : 7.57/10

Research Experience

2014-2020

Ph.D Research – Designing a highly efficient megawatt class RF power source for mobile ionospheric heaters

1. Designed a novel RF source (Grid-less tetrode) capable of operating in megawatt range.
2. Three different device configuration types with differing magnetic field confinement were studied using Particle in Cell code (**MICHELLE**).
3. Challenges in building a highly efficient megawatt class RF source is to ensure maximum energy is extracted across the decelerating gap while ensuring the device remains compact.
4. The secondary electron emissions play a vital role in device efficiency. The collector geometry and magnetic field confinement were optimized to reduce secondary electron emission (**MICHELLE, MAXWELL and HFSS**)
5. The three devices were tested using different static and time-domain simulation runs and are capable of operating with efficiency greater than 90%.

2013-2014

Masters Project

1. Studied the possibility of excited state absorption in praseodymium (Pr) lasers.
2. Characterized the Pr:YLF crystal for various parameters such as lifetime, fluorescence as a function of temperature and finally excited state absorption.
3. Performed Q-switch simulations to see if pulses with duration below 5 ns could be obtained using Pr:YLF crystal (**MATLAB**).
4. No excited state absorption detected in the range of 400-600nm.

2011-2012

Undergraduate Project

1. Worked towards the development of a sensor (FBG aided SPR nanowire humidity sensor) with better sensitivity and a larger sensing range compared to a normal SPR based humidity sensor.

Teaching Experience

Graduate Teaching Assistant (**Cornell University, NY, USA**):

1. Taught students in the lab course AEP 1200: Introduction to Nano-science and Nano-engineering for 2 years.

Graduate Teaching Assistant (**University of Maryland, MD, USA**):

2. Taught students in the lab courses ENEE 307 (Electronics circuit design lab) and ENEE 486 (Optoelectronics lab).

Skills

Design tools: MICHELLE(PIC), Ansys MAXWELL, HFSS, MATLAB, PSpice, Labview

Lab Equipments: Network and impedance analyzers, oscilloscopes, Monochromater, Spectrometer

Languages: C, C++, Linux

Relevant Courses

University of Maryland

Electromagnetic theory I & II, Solid State Electronics, Quantum & Wave Phenomena, Optical Communication Systems, Quantum Electronics, Methods of Mathematical Physics, Theoretical dynamics, Solid State physics, Quantum Technology

Cornell University

Mathematical Physics, Applied Electrodynamics, Lasers and optoelectronics, Computational Physics, Quantum and nonlinear optics, Fiber and integrated optics

Publications

1. "Physics of efficient grid-less tetrodes with intense electron beams", J. Appanam Karakkad, G. S. Nusinovich, A. C. Ting, A. H. Narayan, and T. M. Antonsen Jr., Physics of Plasmas, Vol-26, 2019
2. "Experimental studies on radio frequency sources for ionospheric heaters," Brian L Beaudoin, Antonio Ting, Steven Gold, Amith H Narayan, Richard Fischer, Jayakrishnan Appanam Karakkad, Gregory S. Nusinovich, Thomas M Antonsen Jr., Physics of Plasmas V-25 I-10 P-103116, 2018
3. "High efficiency inductive output tubes with intense annular beams", J. Appanam Karakkad, D. Matthew, R. Ray, B.L. Beaudoin, A. Narayan, G.S. Nusinovich, A. Ting and T.M. Anthonsen, Physics of Plasmas, Vol-24, 2017
4. "High Efficiency inductive output tubes for ionospheric heating", Jayakrishnan Appanam Karakkad, IEEE conference on Plasma Science (ICOPS-2017)
5. J. A. Karakkad, B. L. Beaudoin, J. C. Rodgers, G. S. Nusinovich, N. Goyal and T. M. Antonsen, "Designing an electron gun for an efficient Mobile Ionospheric Heating Source," 2016 IEEE International Vacuum Electronics Conference (IVEC)