
SEMINAR

Plasma Antennas in the Microwave Regime

Speaker: Prof. Antonio-Daniele Capobianco
(University of Padova, Italy)

Date: 17 November 2016 @ 04:00 PM

Location: Room Garda – Polo Scientifico F. Ferrari – Povo

Note: The seminar will be held in English

Contact: Prof. Paolo Rocca (paolo.rocca@unitn.it)



Plasma antennas exploit partially or fully ionized gas to transmit and receive electromagnetic waves, in contrast with conventional antennas that are only made by metal and dielectric materials. These antennas are characterized by key properties that cannot be found in conventional antennas: they can be reconfigured electrically (rather than mechanically) with respect to input impedance, radiation pattern and bandwidth, simply by changing the plasma discharge parameters (e.g., density), on time scales of the order of microseconds or milliseconds; moreover plasma discharges are transparent to electromagnetic waves whose frequency is above the plasma frequency, and also when the plasma is off since it reverts to its neutral state. This allows to arrange many plasma discharges operating at different frequencies, in plasma antenna arrays, and also to reduce the interference between ambient radio waves and the antenna when the plasma is off. The vast majority of the works that can be found in literature focus on plasma antennas operating in the VHF band (30 - 200 MHz), while few studies have been conducted on plasma antennas working at higher frequencies. We have analyzed the main issues related to the realization of plasma antennas in the microwave frequency range (up to several GHz); we have investigated how to dimension the dielectric vessel within which the plasma is confined, how to determine the resonance frequencies of a plasma discharge, and how to realize a good signal coupler for this type of antennas. We also report the first steps towards the realization and the characterization in terms of radiation pattern and reflection coefficient of an early prototype of a gaseous plasma antenna operating at 900 MHz.

• About the Speaker

Antonio-Daniele Capobianco was born in Padova in 1965. In 1989 he received its M.S. degree (Italian Laurea) "Cum Laude" in Electronic Engineering from the University of Padova. In 1994 he received the Ph.D. degree in Electronic and Telecommunication Engineering. Through years 1995-1997 he was a Postdoctoral Fellow at the University of Padova. From 1995 to 1998 he was a visiting Professor at Udine University. From 1998 he is a Research Fellow at the Department of Information Engineering of the University of Padova (tenured since 2001). The threads of the research activity of ADC are the study/numerical analysis of electromagnetic fields propagation both in linear and nonlinear regime in integrated optical devices, and the design and modeling of planar antennas at microwave frequencies for Ultra-wideband and WLAN applications.

ADC is co-author of 146 articles among papers published in international peer-reviewed journals (69) and proceedings of national and international conferences (76) and in book chapters (1). He is serving as referee for several international journals. He is a member of the IEEE Association, of the European Microwave Association (EuMA) and of the "Società Italiana di Elettromagnetismo" (SIEm).