

## ΣΕΜΙΝΑΡΙΟ ΚΕΝΤΡΟΥ ΚΒΑΝΤΙΚΗΣ ΠΟΛΥΠΛΟΚΟΤΗΤΑΣ & ΝΑΝΟΤΕΧΝΟΛΟΓΙΑΣ/ CCQCN SEMINAR

**Monday, 12 October 2015**

**12:00-13:00**

**3<sup>rd</sup> Floor Seminar Room**

### **Infinite-Power Wireless Devices**

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#### **Abstract**

The speed that electromagnetic energy is transferred from a source to a non-short-circuited load through free space is a quantity which crucially determines the performance of numerous devices such as absorbers, wireless chargers, antennas etc. Therefore, it is worth to study the materials and the configurations leading to a maximal power which is the major objective of this presentation.

The basic idea to transfer huge (ideally infinite) power from one point to another is to exploit optimally not only the propagating waves emitted by the source but also the evanescent modes. We found that the optimal load which is conjugately matched to every single mode (propagating or evanescent) of the free space is a combination of two well-known concepts: the Perfectly Matched Layer (PLM) and the Double Negative (DNG) media. In particular, a uniaxial DNG PML material can absorb infinitely fast the electromagnetic energy (when it is a bit lossy) and can emit infinite power (when it is a bit active).

Such unbounded results are owed mainly to the evanescent waves which possess infinite spectrum and get coordinated to transfer power back and forth; however, they inevitably vanish in the far region. This near-field feature is beneficial for the absorbing effect but disastrous for the radiating operation. Therefore, in an attempt to “launch” these huge fields in the far region we use numerous small cylindrical particles acting as radiation “vessels” which improve substantially the emission performance.

