



Universidad  
Carlos III de Madrid

# Seminario del Instituto Gregorio Millán

## Extraordinary optical transmission from a microwave engineering perspective

Prof. Francisco Medina    Prof. Francisco Mesa

Universidad de Sevilla

### Abstract

Extraordinary transmission of electromagnetic radiation through tiny holes (meaningfully smaller than the wavelength of the involved radiation) made in opaque metal screens was reported 12 years ago in the optical regime. The phenomenon was soon explained in terms of the interaction of the planar uniform impinging waves with surface plasmon polaritons (SPP's) excited at both sides of the metal screen. In a first stage the phenomenon was thought to be characteristic of the optical regime, since only at optical frequencies metals support that kind of waves. However it was theoretically and experimentally verified that the phenomenon also happens at other frequency ranges after proper scaling of the linear dimensions of the system. Although the terminology extraordinary transmission has been used for several different situations, the most relevant case corresponds to the frequency selective enhanced transmissivity through periodic arrays of subwavelength holes or slits. The speakers have considered this case using the point of view of microwave engineers, which are used to deal with generalized transmission systems with discontinuities. The use of the classical theory of waveguides leads to simple models which are surprisingly accurate both from the qualitative and quantitative perspectives. The talk will illustrate how this approach explains the essential physics behind extraordinary transmission and provides a useful tool to design practical devices based on this phenomenon. A review of published and unpublished results will be presented to the audience.

- **DÍA Y HORA: jueves 9 de diciembre de 2010 a las 12:30**
- **LUGAR: Edificio Sabatini. Aula 2.1.D04**