



## Coloquio en Física Morten Willatzen, Professor, PhD.

Departamento de Ingeniería Fotónica  
Universidad Técnica de Dinamarca

### Novel phenomena in piezoelectric semiconductors and acoustics metamaterials

Anfitrión: Gian G. Guzmán Verri

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#### Resumen

A discussion of some novel and exciting phenomena in acoustic structures is presented.

The first part presents the coupling of piezoelectric equations and semiconductor drift-diffusion equations and demonstrates in the plasmon frequency range where the permittivity approaches zero that large acoustic gains can be achieved under the action of a constant electric field by virtue of the Cherenkov effect. The gain can be several orders of magnitude. Device structures for acoustic amplification are also demonstrated theoretically.

The second part of the talk is a demonstration of highly effective acoustic absorbers consisting of porous lamella-air structures and that the absorption becomes higher for less than 100% filling fraction of the porous material. Results are compared with experiments that verify the result and the strong absorption is shown to stem from strong delay times of acoustic propagation.

Finally, and to the extent allowed by time, a brief overview of the research activities at the Department of Photonics Engineering at the Technical University of Denmark will be presented.

#### Biografía del Dr. Willatzen



Morten Willatzen es subdirector y profesor en el departamento de ingeniería fotónica de la Universidad Técnica de Dinamarca. El Dr. Willatzen realizó sus estudios doctorales en el instituto Niels Bohr de la Universidad de Copenhague y ha sido investigador en la Universidad de Aarhus y el Instituto Max Planck. En el año 2000 fue nombrado profesor asociado y en del 2004-2012 fue profesor catedrático en Modelos Matemáticos del Instituto Mads Clausen de la Universidad del Sur de Dinamarca. Sus áreas de investigación son la física del estado sólido, la física matemática y metamateriales.

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