



**Prof. Sánchez Dehesa**

**Abstract**

Sonic crystals are periodic distribution of sound scatterers embedded in a fluid. The properties of sonic crystals are specially interesting in the low frequency domain, where they behave like homogeneous acoustic materials whose parameters (bulk modulus and mass density) shows unusual behavior in comparison with that of their components.

The resulting artificial structures can be considered as acoustic metamaterials since they can exhibit exotic fluid-like properties like anisotropic mass density, negative bulk modulus, negative mass density or density-near-zero. It will be shown that these properties can be tailored by properly choosing the scattering units. For example, effective parameters with negative values are obtained using scatterers with embedded resonances.

These new properties are used to propose fascinating acoustic devices like gradient-index refractive lenses, omnidirectional absorbers, acoustic cloaks, focusing devices based on negative refraction or devices allowing perfect transmission through narrow channels and sharp corners.