1056-35-256 **Fioralba Cakoni*** (cakoni@math.udel.edu), Department of Mathematical Sciences, Newark, DE 19716. *Interior Transmission Eigenvalue Problem and its Application in Inverse Scattering Theory.*

We first consider the scattering of time harmonic plane waves by a perfectly conducting infinite cylinder of cross section D. We observe that the Dirichlet eigenvalues for the Laplacian in D can be determined from the far field pattern of the scattered wave and hence from the Faber-Krahn inequality we can obtain a lower bound for the area of D. We then consider the corresponding problem for a dielectric cylinder. Here we observe that a relatively new type of spectra called transmission eigenvalues can be determined from the far field pattern of the scattered wave and show that infinitely many transmission eigenvalues exist and form a discrete set. We then obtain a Faber-Krahn type inequality for transmission eigenvalues which,if D is known, provide a lower bound on the index of refraction n(x). Of special interest is the case when cavities may be present,i.e. regions where n(x)=1.We consider both isotropic and anisotropic materials. (Received August 20, 2009)