SPECTRAL ASYMPTOTICS OF THE DIRAC OPERATOR ON A THIN SHELL

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In this talk, we will consider the Dirac operator with infinite mass boundary conditions on a tubular neighbourhood of a smooth compact hypersurface in $\mathbb{R}^n$ without boundary. We will discuss the asymptotic behaviour of the eigenvalues of this Dirac operator when the tubular neighbourhood shrinks to the hypersurface. It turns out that this asymptotic behaviour is driven by a Schrödinger operator on the hypersurface involving electric and Yang-Mills potentials of geometric nature. The eigenvalues of the effective Schrödinger operator appear in the third term of the asymptotic expansion with respect to the thickness of the tubular neighbourhood. The analysis relies on the min-max principle applied to the square of the Dirac operator. The main difficulty in this analysis is that the boundary condition for the transverse operator depends on the direction of the normal to the hypersurface. These results are obtained in collaboration with Thomas Ourmières-Bonafos.