TITLE. Boundary value problems for Schrödinger equations with strongly singular potentials.

ABSTRACT. We consider Schrödinger operators of the form $L^V = \Delta + V$ in domains $\Omega \subset \mathbb{R}^N$ with $V = \mu/\delta_F(x)^2$, $F \subset \partial\Omega$ compact, $\delta_F(x) = \operatorname{dist}(x, F)$ and μ a constant $< c_H(V)$ (= the Hardy constant for V in Ω). If Ω is a bounded Lipschitz domain $c_H(V) > 0$ and the condition $\mu < c_H(V)$ implies that L^V is weakly coercive in the sense of Ancona (Ann. Math. 1988). Therefore L^V possesses a Green kernel and a positive eigenfunction and the Boundary Harnack Principle is applicable.

In this talk we introduce a notion of normalized boundary trace and - under various restrictions on F - discuss existence, uniqueness and a-priori estimates of solutions of boundary value problems for L^V with normalized boundary trace. Applications to some related nonlinear problems will also be discussed. Recently derived sharp estimates of Green and Martin kernels of L^V play a crucial role in this discussion.

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