

## **The Schrödinger Equation in time-dependent domains: Continuous and Discontinuous Galerkin Methods**

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We analyze Galerkin-finite element methods that approximate the solutions of initial-boundary-value problems for Schrödinger evolution equations in time-dependent domains. Error estimates of optimal rates of convergence in  $L^2$  and  $H^1$  are proved for the associated semidiscrete and fully discrete Crank-Nicolson-Galerkin approximations. For the Dirichlet problem we construct Discontinuous in time space-time Galerkin methods. We establish the existence and uniqueness of numerical solution and as well as an abstract error estimate.