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## DK Seminar

June 15, 2016, 14:15 - 15:45

University of Vienna,

Oskar-Morgenstern-Platz 1, WPI seminar room, 8th floor

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### **An Airy function approach to efficiently approximate highly oscillating differential equations including turning points**

We are concerned with the highly oscillatory regime of a stationary Schrödinger equation including so-called turning points, i.e. zeros of the coefficient function. A rather straightforward method is done via piecewise linear approximation of the coefficient function on subintervals. This leads to a related equation to which solutions are piecewise scaled Airy functions. The error we encounter compared to the original equation in terms of the step-size  $h$  and the rescaled Planck constant  $\varepsilon$  is investigated. In a second approach we developed a hybrid method by first transforming the ODE using an Airy function-ansatz hence to eliminate the dominant oscillations. This ODE can then be solved using asymptotic expansions, which yields an asymptotically correct scheme that is first order consistent with no necessity for a fine spatial grid.