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**UNIVERSITÄT
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SEIT 1386

STRUCTURES JOUR FIXE

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“Eigenvalue problems for nonlinear
differential equations”

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ABSTRACT

In this talk we generalize the concept of a differential-equation eigenvalue problem from linear to nonlinear differential equations. The role of the eigenfunction is now played by a separatrix curve, and the special initial condition that gives rise to the separatrix curve is the eigenvalue. The Painlevé transcendents are examples of nonlinear eigenvalue problems, and nonlinear semiclassical techniques are devised to calculate the behavior of the large eigenvalues. This behavior is found by reducing the Painlevé equation to the linear Schrödinger equation associated with a non-Hermitian PT-symmetric Hamiltonian. The concept of a nonlinear eigenvalue problem extends far beyond the Painlevé equations to huge classes of nonlinear differential equations.

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