



THE UNIVERSITY OF  
**CHICAGO**

THE COMMITTEE ON  
COMPUTATIONAL AND  
APPLIED MATHEMATICS

**CAM & DEPARTMENT OF MATHEMATICS JOINT  
SPECIAL COLLOQUIUM**

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**BERND STURMFELS**

Max Planck Institute for Mathematics in the Sciences

**Algebraic Varieties in Quantum Chemistry**

**THURSDAY, May 30th, at 4:00 PM**

Jones 303, 5747 S. Ellis Ave. Chicago, IL 60637

ABSTRACT

We discuss the algebra and geometry behind coupled cluster (CC) theory of quantum many-body systems. The high-dimensional eigenvalue problems that encode the electronic Schroedinger equation are approximated by polynomial systems at various levels of truncation. The exponential parametrization of the eigenstates gives rise to truncation varieties. These generalize Grassmannians in their Pluecker embedding. We explain how to derive Hamiltonians, we offer a detailed study of truncation varieties and their CC degrees, and we discuss the solution of the CC equations. This is joint work with Fabian Faulstich and Svala Sverrisdóttir.

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