University of Florida | Mathematics Department

EIGHTH ERDŐS COLLOQUIUM

Operator Theory and the K-Homology of Algebraic Varieties

presented by

William Arveson, University of California, Berkeley

Thursday
March 2, 2006
4:00 - 5:00pm
Reitz Union 282

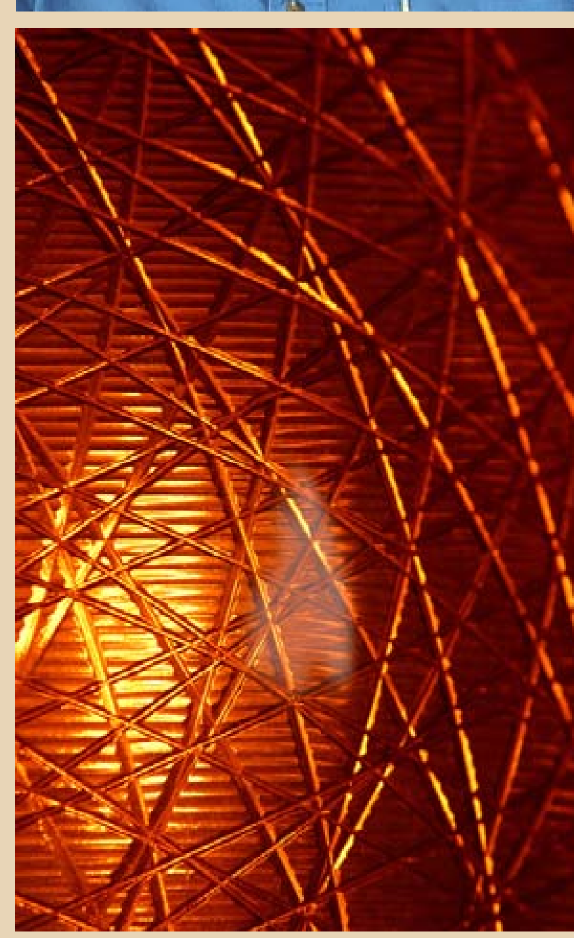
OPENING REMARKS by Neil Sullivan
Dean of the College of Liberal Arts and Sciences
Refreshments Before the lecture at 3:30 pm

Abstract: Let X, Y, Z be three mutually commuting operators acting on a common Hilbert space that satisfy a nonlinear equation of the form

$$\text{(1)} \quad \mathbf{X}^n + \mathbf{Y}^n = \mathbf{Z}^n,$$

for some n=2,3,.... The C*-algebra generated by X,Y,Z is typically non-commutative, and can be viewed as a non-classical counterpart of the curve $V \subseteq \mathbf{C}^3$ defined by $x^n+y^n=z^n$. Similarly, there are natural non-classical counterparts of more general algebraic varieties $V \subseteq \mathbf{C}^d$.

Starting from first principles, we describe a natural construction of *universal* operator solutions of equations like (1) and we describe the general properties of these operator solutions, focusing on the question: When does an operator solution of a system of equations like (1) determine an element of the *K*-homology of the associated classical variety V? We formulate this question as a concrete conjecture about self-commutators -- such as $X^*X - XX^*$, $X^*Y - YX^*$, ... in example (1) -- and describe recent progress on proving the conjecture in general.



William Arveson is professor of mathematics at the University of California, Berkeley. He has held numerous visiting positions and fellowships including Newcastle (UK), Aarhus, Rio de Janeiro, Oslo, UC San Diego, Nankai, Canberra, Penn, Trondheim, Kyoto, two years (1985-86 and 1999-00) as Miller research professor at Berkeley. His theory of extensions of completely positive maps now permeates the study of operator algebras. A current interest is the study of endomorphisms of operator algebras (E_0-semigroups), which models non-commutative dynamics arising in quantum theory.

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