

The PHI BETA KAPPA Society

VISITING



SCHOLAR

PROGRAM

INGRID  
DAUBECHIES

DUKE UNIVERSITY

James B. Duke Professor Emerita of  
Mathematics and Electrical and Computer  
Engineering

PUBLIC LECTURE  
OFFERINGS

**MATHEMATICIANS HELPING ART CONSERVATOR AND ART HISTORIANS**

Art conservators make use of many scientific tools, such as X-ray and infrared imaging or chemical analysis. Less well known is that different types of mathematical algorithms have also shown to be very useful. This talk would review some examples and explain how they work.

**SIGNAL AND IMAGE COMPRESSION**

Digital image compression for high-resolution applications, such as sports transmissions and digital cinema, makes use of very interesting mathematical ideas -- the wavelet transform and sparse expansions. This talk explains and illustrates how they work.

**CHAOS -- WHAT DOES IT MEAN?**

A dynamical system is the general name given by physicists and mathematicians to the mathematical description of quantities or trajectories that change in time, such as the system of planets orbiting a star. Many dynamical systems exhibit chaotic features. What does that mean? In this talk, we see some simple examples of chaotic dynamics, and study its consequences.

## CLASSROOM DISCUSSION TOPICS



### 1. MATHEMATICAL ART

What is it? Can you make some yourself? There are so many reasons to do so: because it is delightful to oneself and others, because it illustrates mathematical concepts, because it helps figure out new ways of looking at problems.

### 2. EXPERIENCES IN INTERDISCIPLINARY COLLABORATIONS WITH SCIENTISTS IN OTHER DISCIPLINES, ENGINEERS AND ART HISTORIANS

How do such projects start? How does it work? How serious is the math involved?