

# KY NSF EPSCoR 2002-2008

11<sup>th</sup> Annual Kentucky EPSCoR Conference – KY NSF EPSCoR Breakout Session

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*The presenters will provide a summary of recent/future NSF EPSCoR program activities. The presentations will be 8 minutes with 4-5 minutes at the end for questions.*

Introduction/Welcome                      John Connolly, KY NSF EPSCoR Director                      2:30 - 2:35

## **Phase 5 Initiatives (2002 - 2005)**

Functional Genomics                      Brian Rymond, UK Biology                      2:35 - 2:47

Proteomics                      David Rodgers, UK Biochemistry                      2:47 - 2:59

NEMS/MEMS Core Facility                      John Naber, UofL Electrical and Computer Eng.                      2:59 - 3:11

Structural Biology                      Andrew Lane, UofL Medicine                      3:11 - 3:23

Environmental Watershed                      George Kipphut, Murray St. Geosciences                      3:23 - 3:35

ERTL Lab                      Alan Fryar, UK Geological Sciences                      3:35 - 3:47

## **Phase 6 Initiatives (2005 - 2008)**

Environmental Research Institute                      Alice Jones, ECU Geography  
Danita LaSage, ECU Earth Sciences                      3:47 - 3:59

Nanotechnology                      Zhi Chen, UK Electrical and Computer Eng.                      3:59 - 4:11

Metabolomics                      Teresa Fan, UofL Chemistry                      4:11 - 4:23

Virtual Environments                      Chris Jaynes, UK Center for Visualization                      4:23 - 4:35

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## **Initiative Summaries:**

### Functional Genomics:

Large-scale DNA sequencing initiatives, such as the human genome project, have produced an unprecedented amount of genetic data. The organization and analysis of this data requires innovative computational approaches in an area of research known as bioinformatics. KY NSF EPSCoR support has attracted leading research faculty, developed facilities, and secured the automated equipment needed to isolate and characterize genomic materials. With this valuable support, life scientists in Kentucky are now enabled to conduct highly competitive research in these areas.

### Proteomics:

Proteomics, an emerging field of study, allows for more in-depth examinations of living cells, tissues and purified proteins. To be highly competitive, Kentucky's life sciences researchers must be trained in these areas and have access to emerging tools and technologies. With KY NSF EPSCoR support, this initiative recruited two faculty members trained in molecular/computational proteomics, protein production and characterization/computational proteomics at the University of Kentucky. This initiative also provided needed state-of-the-art equipment.

### NEMS/MEMS Core Facility:

KY NSF EPSCoR support significantly enhanced the University of Louisville's Bio Nano- and Micro-Electro-Mechanical Systems Core Facility. This has benefited researchers in the departments of mechanical engineering, electrical engineering, biochemistry and molecular biology, chemistry, chemical engineering and surgery. The enhancement of the core facility via the purchase of additional equipment and the recruitment of new researchers will greatly improve Kentucky's competitiveness in these areas of study.

### Structural Biology:

With KY NSF EPSCoR funding, this initiative focused on analyzing molecular properties using a powerful Nuclear Magnetic Resonance (NMR) spectrometer. This piece of equipment uses superconducting magnets and radio waves to create three-dimensional views of molecular structures to help determine how they behave. The spectrometer has enabled a detailed study of protein and nucleic acid structures—making it possible, for example, to determine how various disease cells, such as cancer or Alzheimer's, interact with one another or react to potential treatments. The large scale NMR was one of only 24 in the world in 2002.

### Environmental Watershed:

The award developed a Center for Watershed Environments at Murray State University (MuSU), and served to promote collaboration among MuSU and UK faculty in the form of new environmental research and education activities. The project has enabled the recruitment of new faculty members with expertise in environmental sciences and aided in the acquisition of new instrumentation vital to competitive research. Additionally, the project has helped Kentucky institutions align themselves better with some of the new environmental science initiatives supported by federal agencies.

### Environmental Research and Training Laboratories (ERTL):

KY NSF EPSCoR funding enabled the development of several centralized, state-of-the-art laboratories that continue to support a variety of environmental research at UK and other Kentucky institutions. Examples include: a Geosciences Facility centered on an isotope-ratio mass spectrometer; an Inorganic/Organic Facility; a Microbial Facility; and a computer facility for data handling, statistical analysis and publication. These labs were equipped and staffed with EPSCoR support and are able to facilitate competitive research in a wide variety of environmental areas.

### Environmental Research Institute:

This initiative will fund the establishment of an Environmental Research Institute at ECU and allow ECU to join the Kentucky Environmental Research and Education Consortium (formed previously using EPSCoR support). This KY NSF EPSCoR funding will also support student environmental research in central and western Kentucky via the UK Tracy Farmer Center, KY Geological Survey, and the UK ERTL Laboratories.

### Nanotechnology:

This initiative represents a collaborative effort to build nanotechnology infrastructure at UofL, UK, and Kentucky State University (KSU)—Kentucky's only HBCU. The initiative will focus in four areas of nanotechnology research: electronics, materials, sensors and biotechnology. The UofL effort will attract support engineers, technicians and new faculty with nanotechnology expertise to complement existing facilities. The UK effort will provide processing and characterization equipment and new faculty lines. Finally, KSU's efforts will be student focused—providing computer lab equipment and new nanotechnology courses.

### Metabolomics:

The emerging field of metabolomics represents the next step after genetics and proteomics—by studying organisms' systemic interactions. KY NSF EPSCoR funding will provide two mass spectrometers that will complement the recent (EPSCoR-supported) initiatives in genetics, proteomics and structural biology. This investment will establish a state-of-the-art Center in this area—making Kentucky a leader in this field of study.

### Virtual Environments:

Support of this initiative will provide equipment, personnel and students to develop new research projects and capabilities in the fields of visualization and virtual environments—an area that has been revolutionizing many other STEM fields. KY NSF EPSCoR support will serve to further develop the research capabilities of the UK Center for Visualization and Virtual Environments—an initiative started with “new-economy” funds from the State.