

# Opening Workshop

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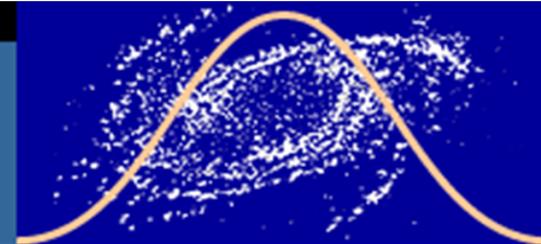
**2016-2017 SAMS I ASTRO**



PennState

Eberly College of Science

Center for Astrostatistics



# Why astrostatistics?

Astronomers encounter a surprising variety of statistical problems in their research:

- The sky has vast numbers of stars & galaxies and gas on all scales. Most stars have orbiting planets, most galaxies have a massive black hole
- Astronomers acquire huge datasets of images, spectra & time series of planets, stars, galaxies, quasars, supernovae, etc.
- Various properties of cosmic populations observed and empirically studied with all kinds of telescopes ( $n \gg p$ )
- Properties are measured repeatedly but with irregular spacing Parametric modeling of data using nonlinear astrophysical models
- Spatial distributions in sky (2D), space (3D), and parameter space ( $pD$ ) is complex (MVN assumption usually inapplicable)

Next few days you will hear details of statistical issues encountered in astronomy.

Eric Feigelson and I started collaborating in late 1980s and the term 'Astrostatistics' was coined in mid 1990s, when we published the book by the same name.

# Astrostatistics at SAMSI

- Astrostatistics Program at SAMSI January 2006
  - Opening workshop January 18-20, 2006 ([Bayesian astrostatistics](#), [Nonparametric inference](#), and [Astronomy for Statisticians](#))
  - Working groups ([Exoplanets](#), [Surveys & Population studies](#), [Gravitational Lensing](#), [Source detection & feature detection](#), and [Particle Physics](#))
  - Concluded with SCMA IV at Penn State in June 2006
- Astrostatistics sub Program Fall 2012 - as part of Statistical and Computational Methodology for Massive Datasets program.
  - Working groups ([Discovery & Classification in Synoptic Surveys](#), [Inference & Simulation in Complex Models](#), [Stochastic Processes & Astrophysical Inference](#), and [Graphical Models & Graphics Processors](#))
- Summer 2013: Modern Statistical and Computational Methods for Analysis of Kepler Data: June 10-28, 2013

- SCMA (once in 5 years since 1991)
  - Starting from SCMA III (2001), the interaction grew stronger.
  - SCMA IV (2006 Stronger), SCMA V (2011 Excellent)
  - SCMA VI (2016 Excellent)
- ISI creates Intl Astrostatistics Assn (2010)
- IAU, AAS, ASA, IEEE → ASAIP (2012-5)
- Funding for astrostatistics research collaborations is very low and inadequate for the needs

The SAMSI ASTRO program will help invigorate  
the field of *astrostatistics*