

# Welcome!

2<sup>nd</sup> Erice School of Neutron Science and Instrumentation  
Designing and Building a Neutron Instrument  
1<sup>st</sup>-9<sup>th</sup> of April 2016

Ken Andersen and Ken Herwig

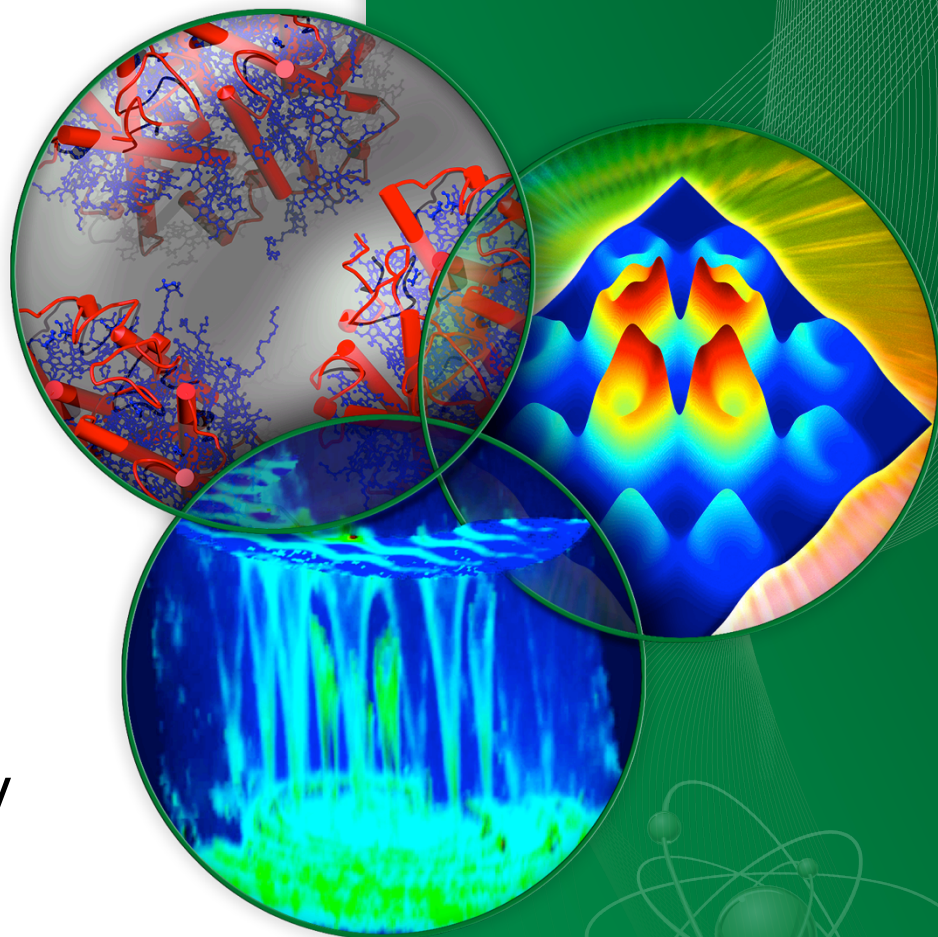
# Who am I?

## Ken Herwig

Instrument and Source  
Development Division

Oak Ridge National Laboratory

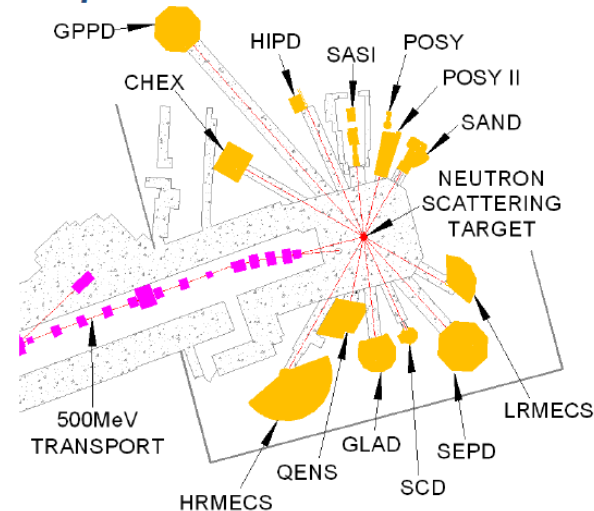
April 1, 2015



# Where I have been

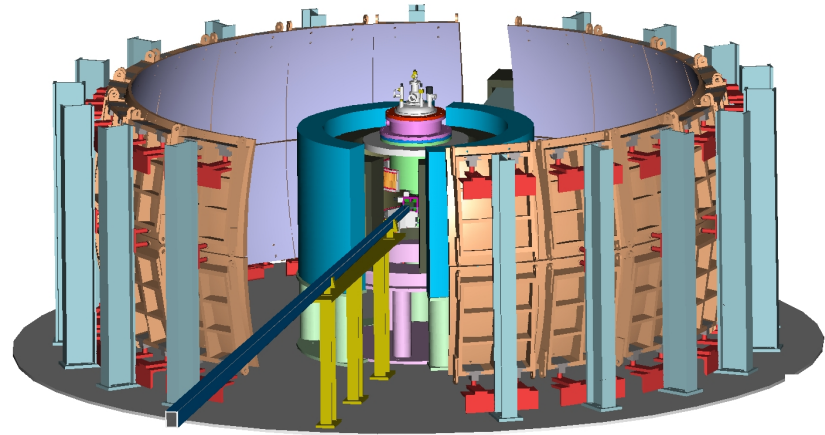
- 1988 Ph.D. – University of Illinois, Champaign Urbana
  - Neutron DINS on Hydrogen (to 2 kbar)  
IPNS Argonne National Laboratory
- 1988-1991- Penn State and Argonne National Laboratory
  - QENS, diffraction, inelastic (quantum materials, geometrically confined molecules)
  - Built an eV spectrometer
- 1991-1998 – University of Missouri Research Reactor
  - Neutron technology
  - Built a triple-axis spectrometer
  - Geometrically confined molecules

*IPNS Experimental Hall and Instruments*



# Where I am – Oak Ridge National Laboratory

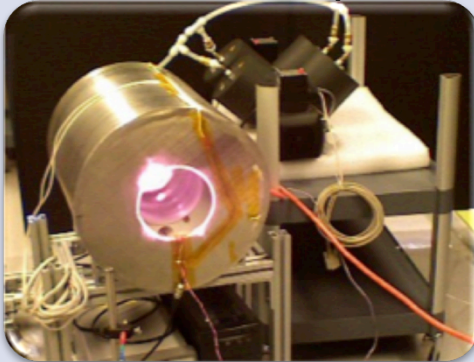
- 1998-2006 – Instrument scientist responsible for the BaSiS near-backscattering spectrometer
- 2003-2006 – Deputy Team Leader for SNS Instrument Systems
- 2006-2011 – Deputy Division Director of Neutron Scattering Sciences Division at ORNL
- 2011 – Present – Manager Instrument Methods and Technology
  - Detectors
  - New instruments
  - Neutronics
  - Neutron optics and polarization
- Other current roles
  - Technical Director for major instrument upgrades/improvements
  - Deputy Project Manager for the SNS Second Target Station project.





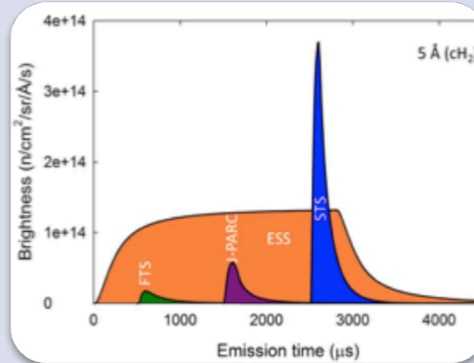
# Instrument development activities— improving performance, adding capability, looking to the future

## Polarization, Optics New Concepts



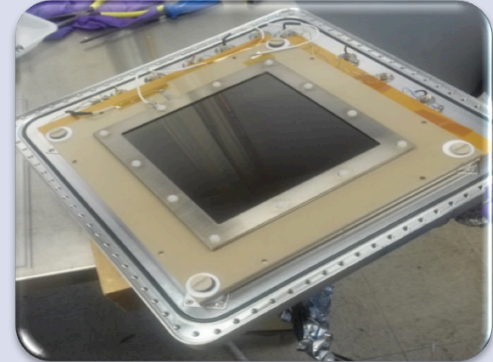
New instrument  
concepts  
Novel techniques  
Polarization  
Optics  
Spin Manipulation  
Devices

## Neutronics



Sources  
Moderators  
Next generation  
Inner Reflector  
Plug  
Diagnosing incident  
beam issues

## Detectors



Improving reliability  
and performance  
Developing next  
generation  
detectors

# Ken Andersen: Who am I?

- 1988-1992 PhD in Physics on elementary excitations in superfluid  $^4\text{He}$  from Keele University (UK) with ILL studentship
- 1992-1994 Post-doc at KENS (Japan) on percolating antiferromagnets
- 1995-1999 ILL Instrument Scientist for D7 diffuse-scattering diffractometer with polarisation analysis
- 1999-2002 ISIS Instrument Scientist for OSIRIS backscattering spectrometer with powder diffraction
- 2002-2010 ILL Head of Neutron Optics Lab

# The Call of the North

2009: The guys who founded the ESS



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- 1995-1999 ILL Instrument Scientist for D7 diffuse-scattering diffractometer with polarisation analysis
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- 2002-2010 ILL Head of Neutron Optics Lab
- 2010: ESS Neutron Instruments Division Head – line manager for instrument scientists
  - Developing and choosing instruments
  - Coordination of instrument construction projects



# Overview of the week

	<b>Morning (8:30-13:00)</b>	<b>Afternoon (14:30-18:00)</b>	<b>Evening (18-19)</b>
<b>Friday</b>		Welcome & Introductions	
<b>Saturday</b>	Introductory Lectures	Instrument Groups	J. Carpenter
<b>Sunday</b>	Optics & Shielding	Instrument Groups	D. Jacobson
<b>Monday</b>	Project Management, Detectors, Engineering	Instrument Groups	R. Senesi
<b>Tuesday</b>	SANS, Reflectometry, Diffraction, Spectroscopy	Excursion	
<b>Wednesday</b>	Energy Selection, Modeling	Instrument Groups	C.K. Loong
<b>Thursday</b>	Polarization, Larmor Precession, Sample Environment	Instrument Groups	J. Carpenter
<b>Friday</b>	Instrument Groups	Group Presentations 1-3	
<b>Saturday</b>	Group Presentations 4-5		

# Instrument Groups

Instrument	Group Members
1. Neutron Imaging Facility David Jacobson	Claudia Aguirre, Phil Denby, Byoungil Jeon, Adrian Bielecki, Number 24
2. Small-Angle Neutron Scattering Andrew Jackson	Giuseppe Vitucci, Liam Whitelegg, Brad O'Dell, Antonio De Bonis, Masako Yamada
3. Powder Diffractometer Thomas Hansen	Mikhail Feygenson, Premek Beran, Ji- Myung Ryu, Alexandra Gibbs, Dominic Fortes
4. Direct Geometry Time-of-Flight Spectrometer Georg Ehlers	Adam Aczel, Joseph Guyon Le Bouffy, Lorenzo Di Fresco, Benjamin Davidge, Luca Silvestrin
5. Larmor Labeling Instrument Roger Pynn	Alessandro Mazza, Giuseppe Aprigliano, Melissa Sharp, Jose Medeiros

# Expectations

- Very Interactive
  - students need to use the information immediately
  - learning by doing
- Skills to work on this week
  - theory of instrument design
  - project management
  - technical and engineering realities
  - working as a group
  - improvising
  - presenting
- Outcome
  - overall picture of the process of designing & building an instrument