EUROPEAN SPALLATION SOURCE

Projects Overview

2nd Erice School of Neutron Science and Instrumentation

Designing and Building a Neutron Instrument

1st-9th of April 2016

Ken Andersen and Ken Herwig

Instrument Groups

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

Work Towards Deliverable: Presentation

- Science Case
- Technical Description of the Instrument
- Project Description
- Conclusion/Summary
- 90 minutes in total, including questions (<60+30)

Science Case

- Why must this instrument be built now?
  - probably presented by one person
- Description of the science that the instrument is optimized to address
- Short description of the technique(s) enabled
- Define the scientific requirements
  - Q-range, Q-resolution, energy/wavelength range and resolution, etc.
  - specialized sample environment, user labs
  - data reduction and analysis software
- User community
  - how large is the current user community?
  - what are the prospects for new communities?
- Complementarity to other instruments

Technical Description

- What does the instrument consist of?
  - presented by several people
- Source chosen and why
  - spallation, reactor, thermal, cold, moderator type, …
- Instrument resolution
  - analytic description of the instrument (back of the envelope, spread sheet calculations)
  - what are the critical elements that determine resolution?
- Anatomy of the instrument – Schematic (PPT) drawing
- Requirements/specifications for critical elements and how these are derived relative to instrument resolution
  - shielding, choppers, guides, sample size & beam divergence, monochromators, analyzers, detectors
- Identify R&D necessary for project success
- Performance estimate – Comparison to existing instruments
  - flux on sample, count rate in detectors, time to complete a measurement, …
- Sample Environment
- Software – control, reduction, analysis

Project Description

- How will the instrument be built?
  - probably presented by one person
- Main project deliverables
  - define project completion criteria (how do you know you're done)
  - define performance metrics (flux on sample, measured resolution, …)
- Work Breakdown Structure (WBS)
  - design, fabricate, install, commission
- High-level schedule
  - 3-month resolution
- High-level cost
- Risk analysis
- Reviews
  - internal & external
- Interaction with user community
  - advisory panels, preparing for friendly users
- Commissioning plan
  - calibration measurements, standard samples, software needs

Conclusion / Summary

- Convince us that we should build the instrument
- Review the key elements
  - probably presented by one person
- Key science addressed by the instrument
- How long it will take to build
- How much it will cost
- Performance estimates