



Kobe City Reservoir  
Above Shin-Kobe Station

# NRS for EBS Workshop Summary

ESRF, Grenoble, France  
12 March 2019

Comments/Summary by Alfred Q. R. Baron

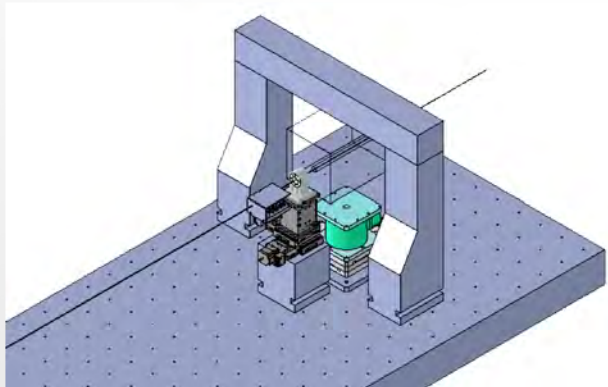
Materials Dynamics Group  
RIKEN SPring-8 Center, RIKEN, Japan

Contents based on workshop talks.  
Focus on implication for EBS Beamline

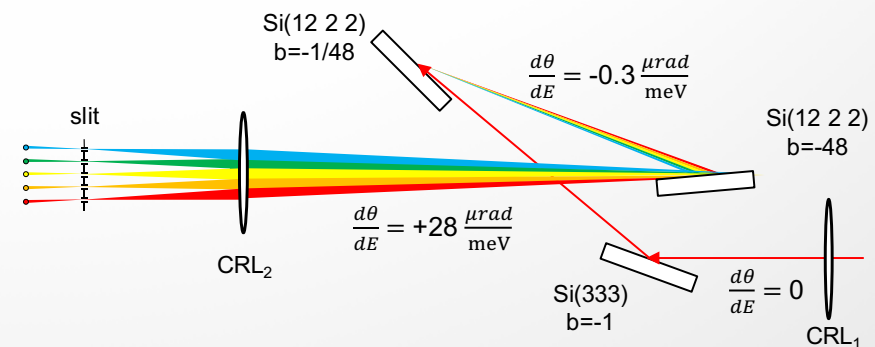
**How to use:**  
**Greatly Improved Brilliance** (ph/s/meV/source size/source divergence)  
 But mostly the same flux (ph/s/meV) (maybe x2?)

## Starting Point

Nano-scope: 0.2-0.1  $\mu\text{m}$



Energy resolution:  $\sim 0.05$  meV



& all other present and previous methods!

# 100 - 200 nm Beam Size

Many, many requests/applications

High pressure in general, pushing pressure limits,  
inhomogenous samples, oxides

Absolutely critical for future HP work, and HPHT/LHDAC

Also generally useful - any inhomogenous or small sample  
concentration of dilute environmentally relevant samples

Note: NFS vs SMS

AB Understanding: Smallest size is for NFS...

SMS possibly worse

Also note: area detector interesting: NFS hard, SMS easy(?)

Analysis issue

Also sometimes fundamental issue (SMS better for broad lines..)

Suggestion (AB): Machine Learning for NFS analysis (& SMS?)

New Direction: Vortex Beams with Orbital Angular Momentum

Comment of L. Dubrovinsky:

Also consider Pump/Probe/Stroboscopic heating

Re EBS: small beam, higher flux (if possible)

# Highly Collimated Beams

Nuclear SAXS ( $\sim\mu\text{m}$  to  $\sim\text{nm}$  scale *correlation lengths*)

Crossed polarizers for Hyperfine spectroscopy

Crossed polarizers for  $\mu\text{eV}$  Spectroscopy

# Extreme (50 $\mu\text{eV}$ ) Resolution

## NIS & Nuclear Analyzer

Localized & Molecular Modes - crystals and solutions.

Low energy contributions to DOS

Glasses

Solvent modes?

Solid state DOS in some cases

Highest resolution requires an extended object large beam for counts

Compromise setup for E resolution and SAXS

(Projected DOS, thin films, islands)

Note: potential overlap/complementarity with INS

NIS wins for DOS

# Future

Definitive ID parameters: what flux (photons/s/meV)? Any increase?

Response By H. Reichardt: Exact ID14 design to be chosen after seeing how EBS performs.

## Optical setup / BL Layout

1. Beam size in NFS and SMS
2. Beam size for high resolution
  - Trade off parallelization/rate and beam size
  - Separate design for smallest beams with modest resolution

Other setups (different and extended):

Nuclear SAXS?  
Crossed polarizers?  
ueV setup?  
10 nm beam?  
Tomography?  
Ptychography?

Other Isotopes & Optical Geometries