DEMIN VII KNOWLEDGE SHARING

EXPERIENCE from X-RAY FACILITIES

VIBRATION MANAGEMENT

Compiled by I. Sutton on behalf of the ‘vibration and alignment working group’

Overview

- Group
  - Cross facility SLS / Swissfel
  - Survey / alignment / metrology / vibration

- Scale of beamlines is equivalent to neutron facilties
  - X-ray beamlines 36m
  - Fel beamlines 150m

- Resultant issue
  - Beam dances on samples (1micron beam)

- Management strategy
  - Mount all beamlines rigidly to slab (1 slab 700m)
  - Design structures for high natural frequencies
  - Create a quiet environment - defined objective / monitor (class Vc-d)

Methods of V. Control

- Monitoring
  - Systems installed at both facilities. cost 2-10kE
  - Data is taken continuously
  - Streamed and available to instruments (SLS) may be used for data veto
  - Streamed and recorded (SFEL), wait for problems
- Principal issues
  - Off site
    - Heavy industrial machines (low frequencies)
  - On site
    - Crane, water pumps, aircon

Alignment

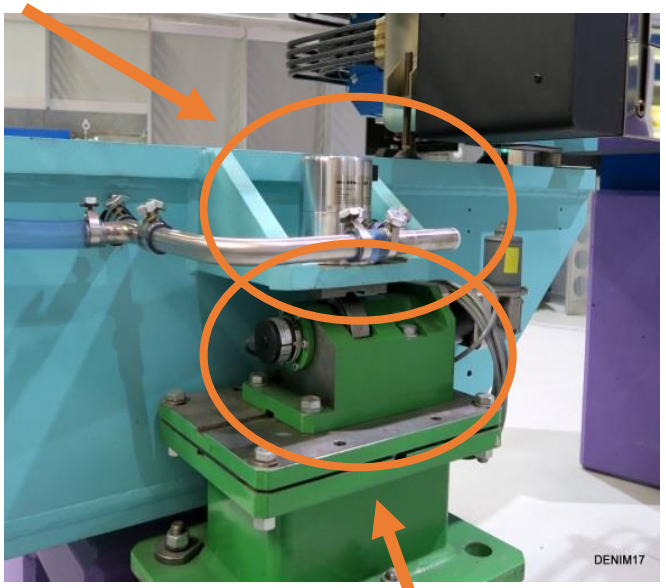
General alignment

- Lazer tracker

Monitoring

- Beamlines equiped for position monitoring and remote adjustment.
- Ground movement is minimal (<1mm) and system is rarely used.
- Issues with reliability of monitoring system.

Hydrostatic height measurement



High precision height adjuster

Relevance to neutron instruments

General case neutron optics

– no performance issue.

- Neutrons use big moderators, big beams, big samples and multiple bounces wash out the effects of minor vibrations
- Vibration less significant than alignment errors

Special case

- Parabolic geometries (small beams, few bounces)
- Liquid reflectometers

- Precautions may be required

Relevance to neutron instruments

Local earthquakes (aka Choppers / pumps / etc)

Neutron instruments ‘local causes’ notable heavy choppers may be the greatest sources of vibration and concern.

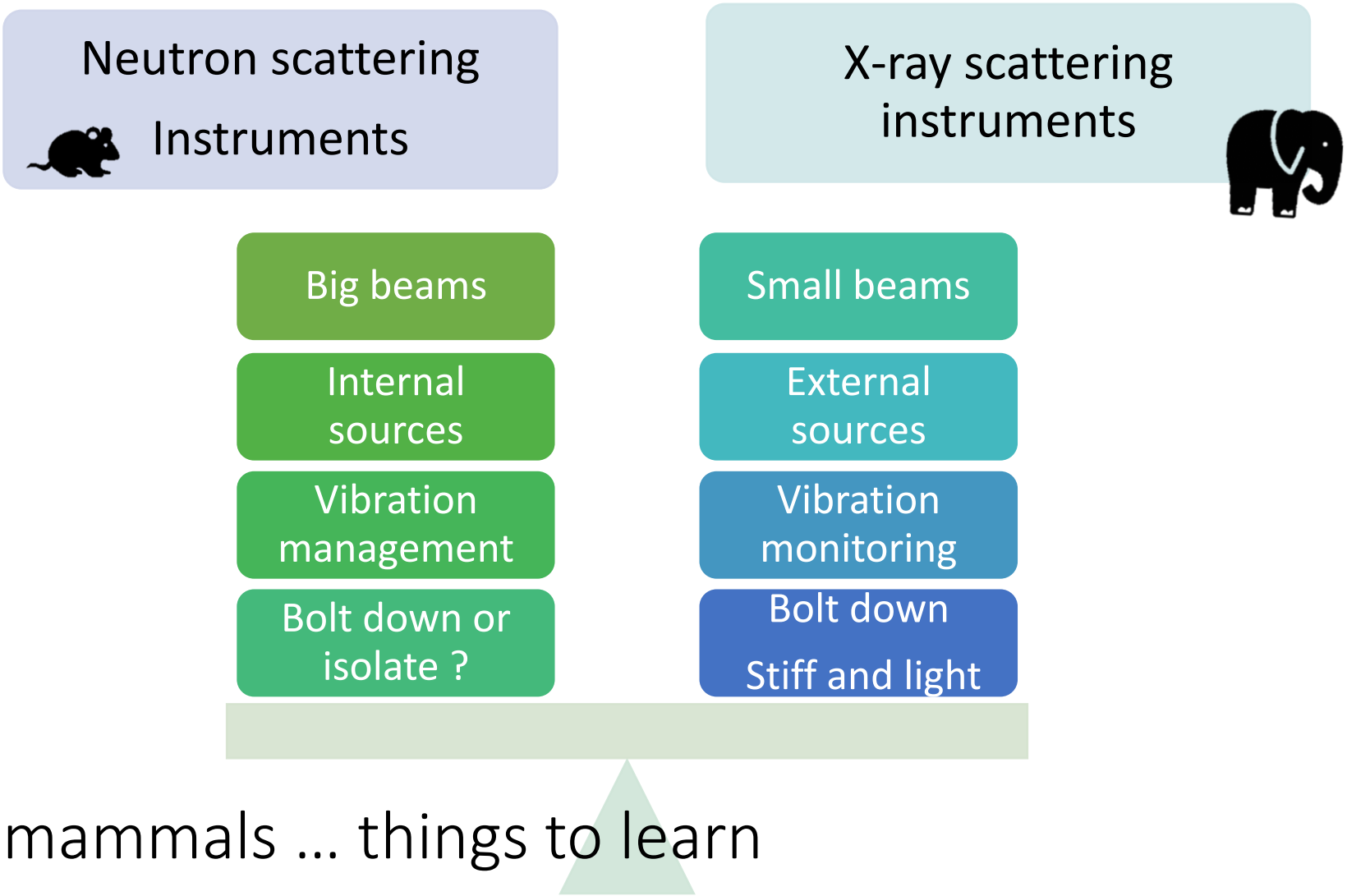
Transmission of vibrations through the slab to neighboring instruments a potential issue.

Unclear whether ‘bolted down’ or an ‘isolator’ strategy would be more effective.

Magnetic bearing on equipment is believed to significantly reduce vibrations issues.

For facilities with long guides the installation of a vibration monitoring system is recommended for diagnostic purposes

Elephants and mice



both mammals … things to learn