Calorimeter Test Beam

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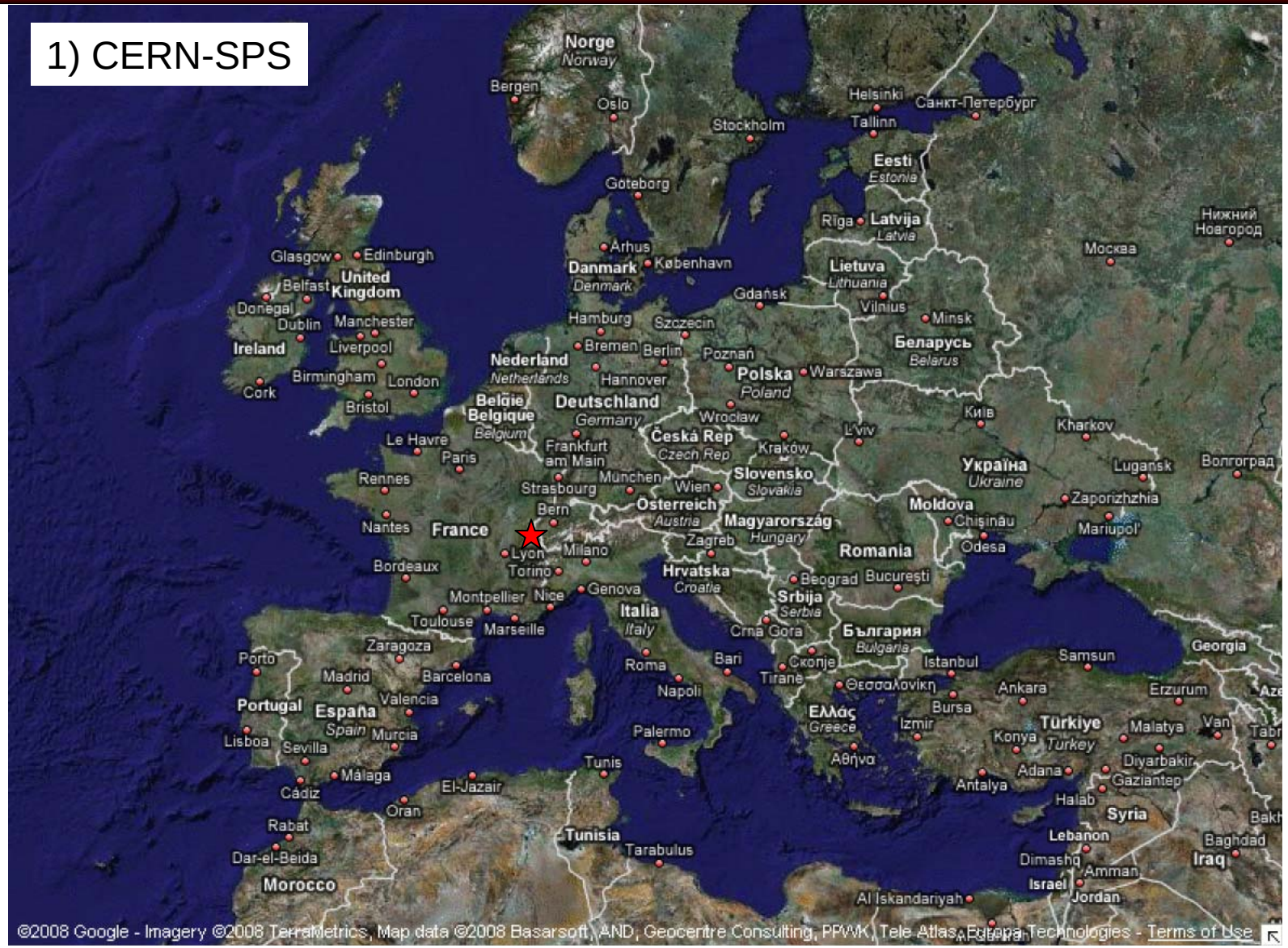
14th - 17th February 2008,
SuperB Detector Workshop I,
SLAC

Queen Mary
University of London

Outline

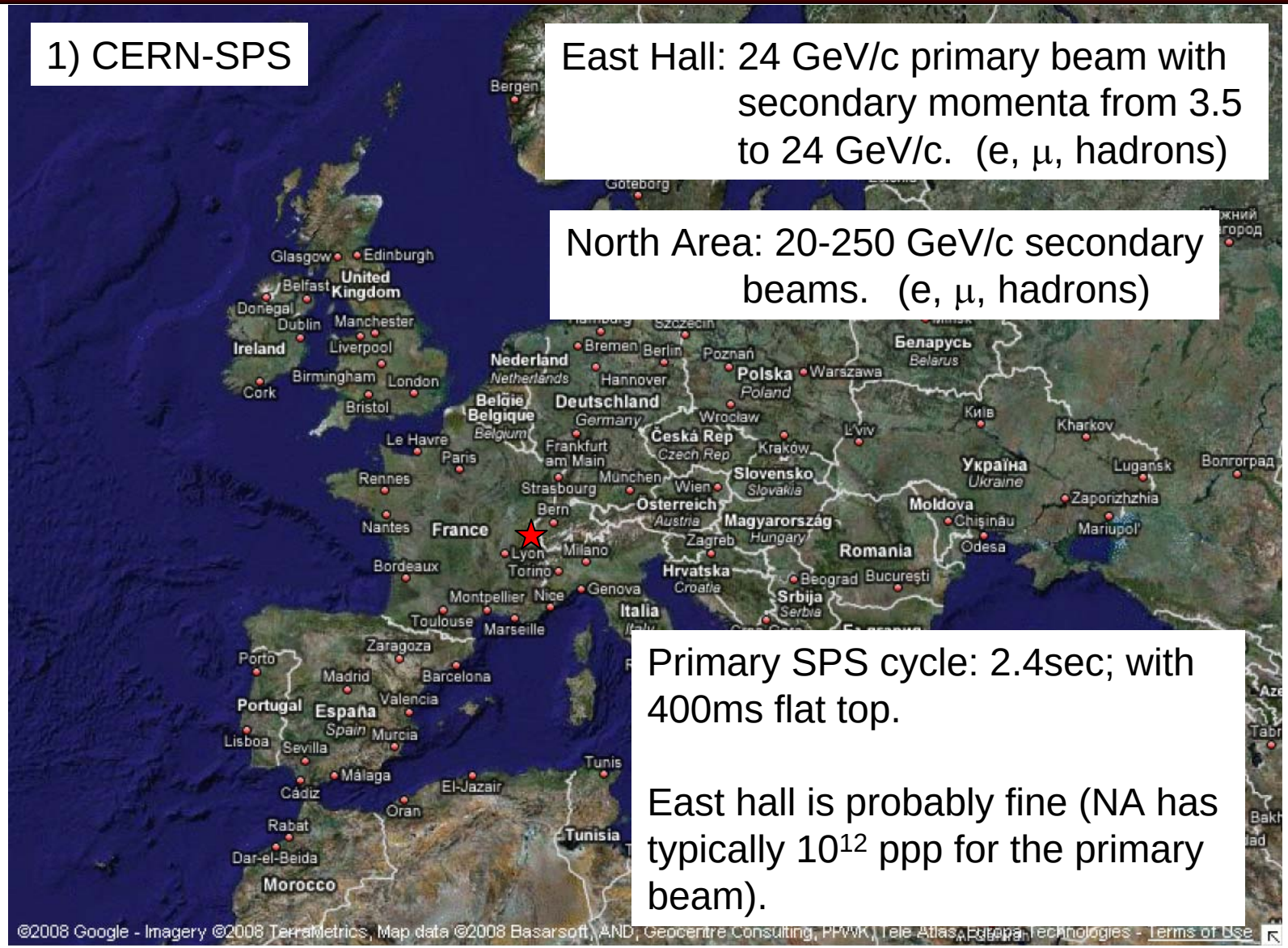
- Test beam site considerations:
  - CERN/DESY/Frascati/PSI
- Prototype issues
  - Crystal layout
  - Photodetector
  - Readout system
- Timescale

Test beam site considerations



See http://ab-div-atb-ea.web.cern.ch

Test beam site considerations



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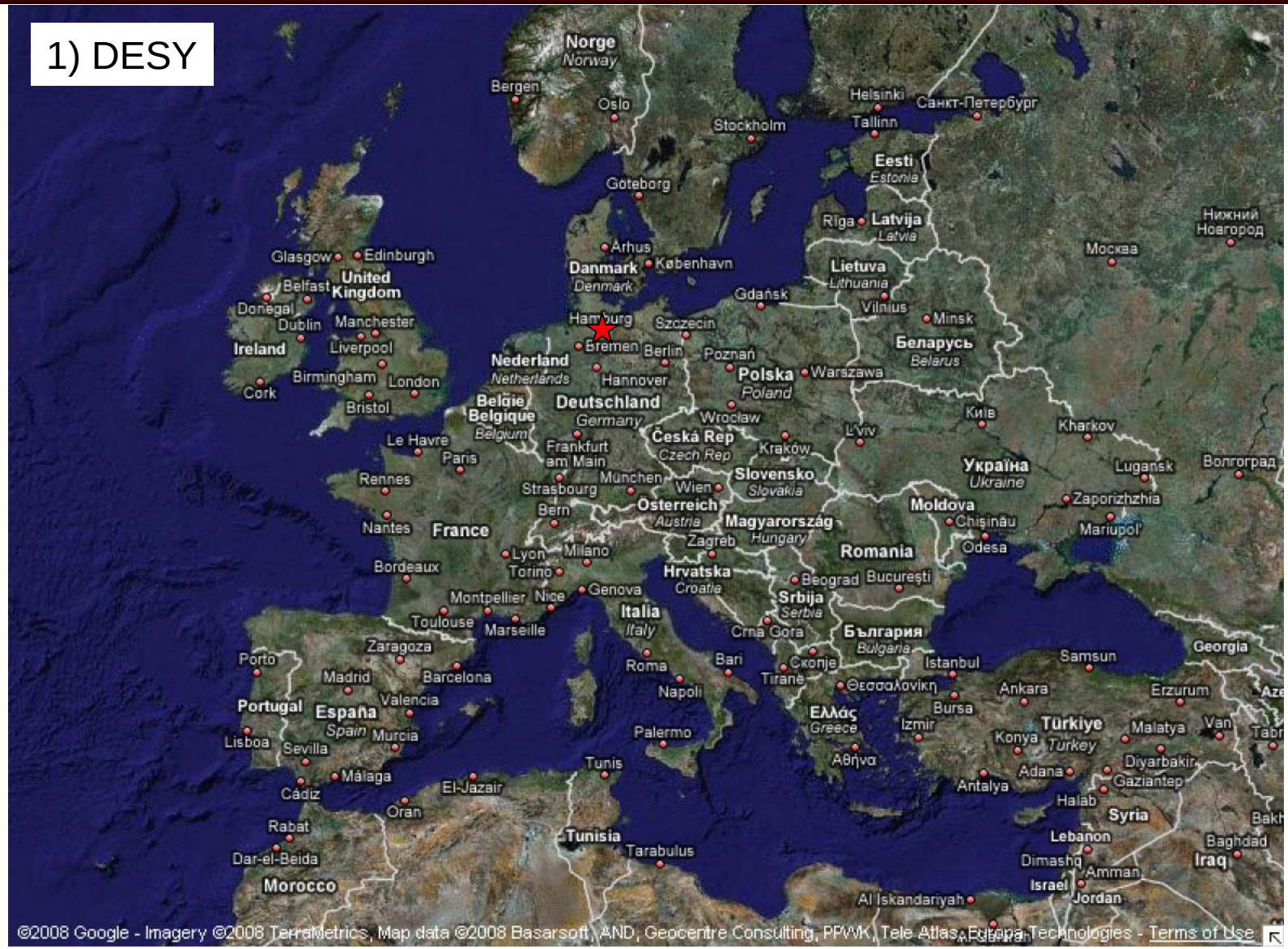
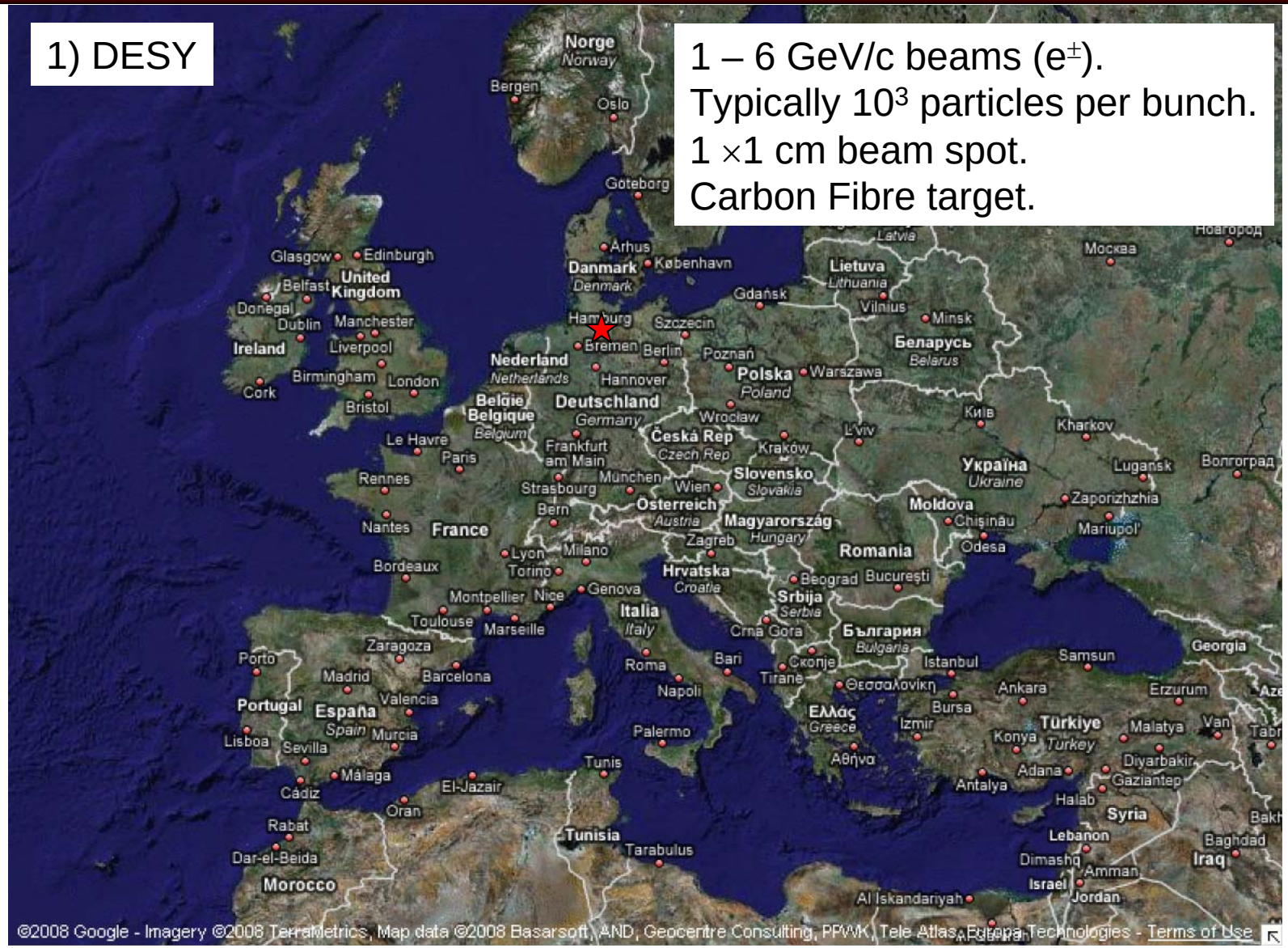
Test beam site considerations



See http://adweb.desy.de/~testbeam/

Test beam site considerations



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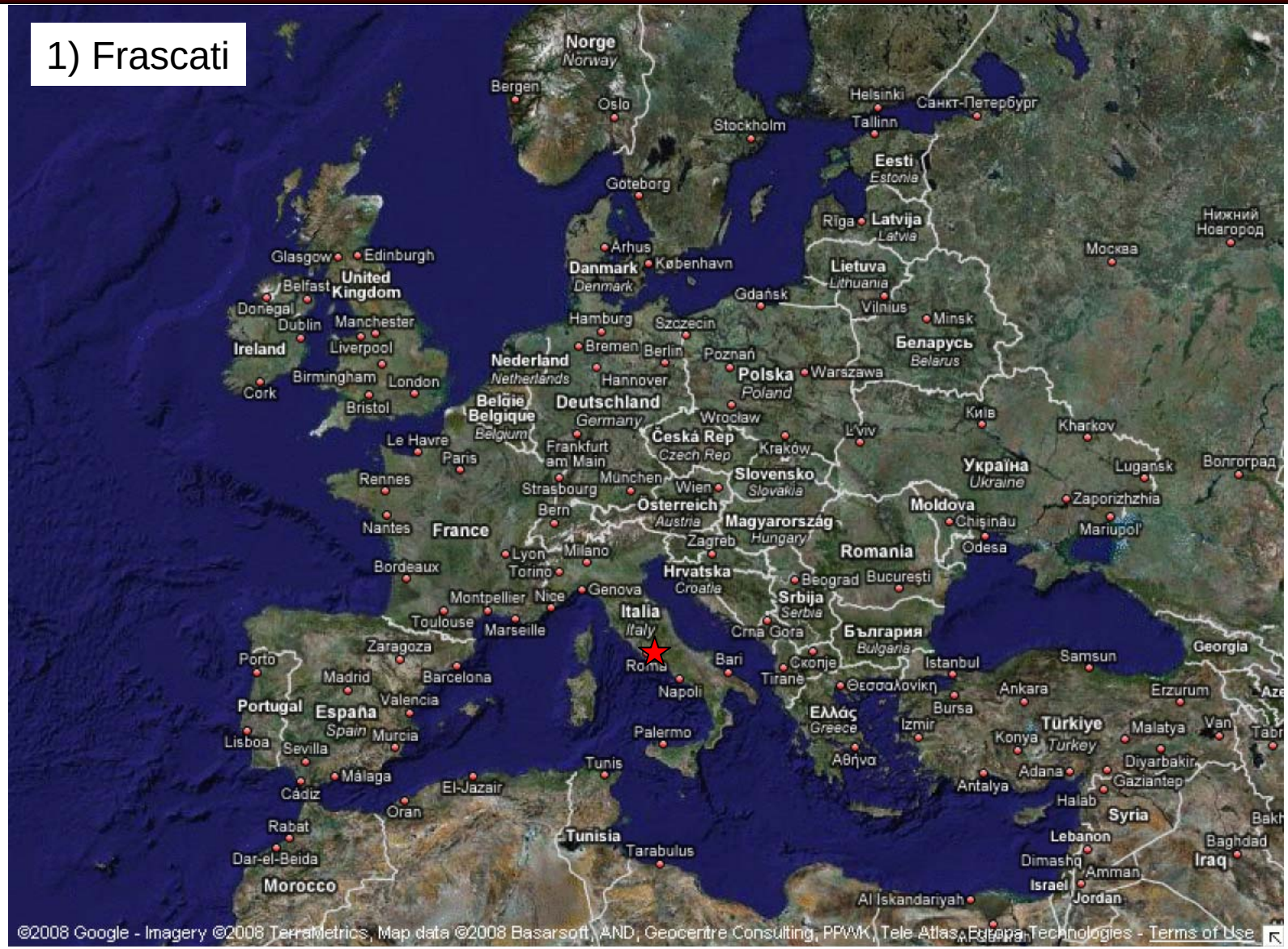
Test beam site considerations



See http://www.lnf.infn.it/acceleratori/btf/

Test beam site considerations

1) Frascati

25-750 MeV beams ($e^{\pm}$).
Typically 10^3 particles per pulse.
1-10 ns pulses at a 50Hz rate

See http://www.lnf.infn.it/acceleratori/btf/

Test beam site considerations

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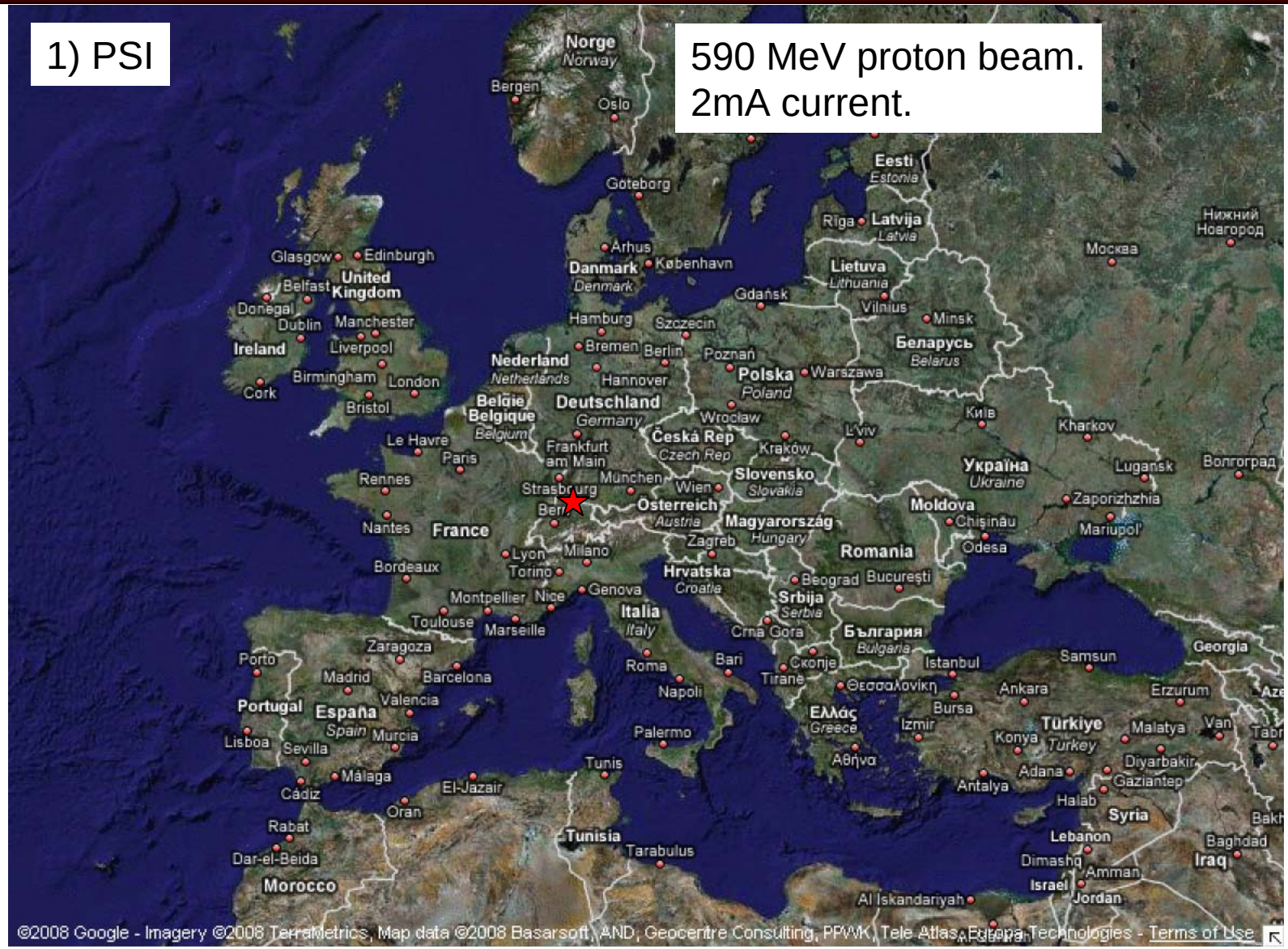


See http://www.psi.ch/forschung/benutzerlabor_protonen_e.shtml

Prototype Issues

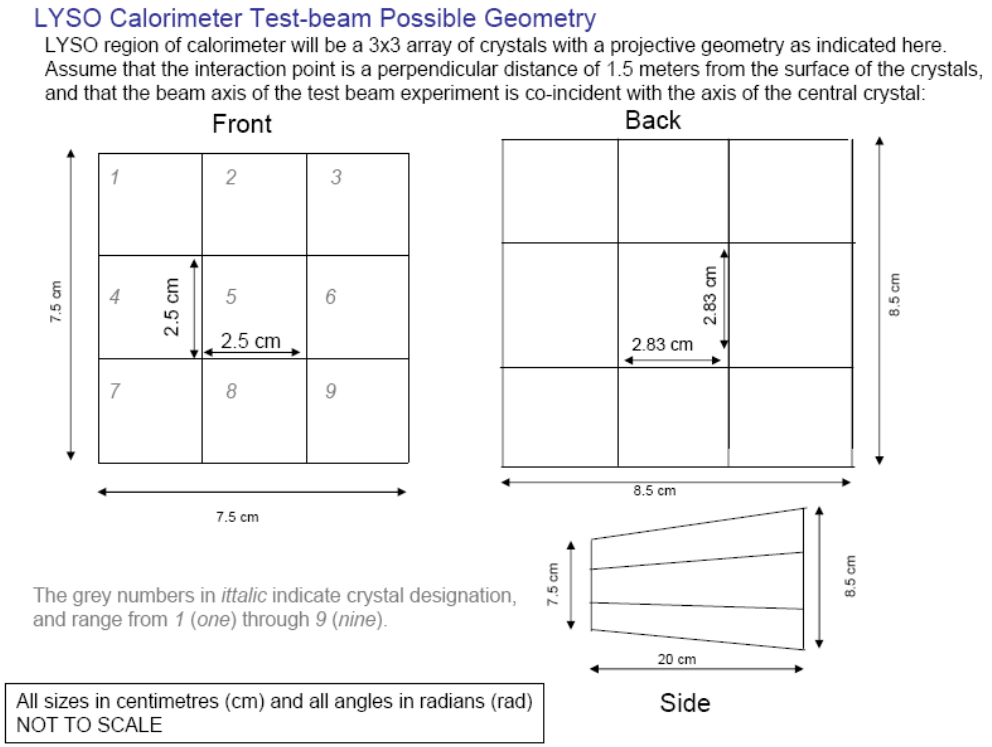
Crystal Layout

Crystal Layout

- Need a large enough prototype to contain a complete shower:
  - 5×5 or 7×7 crystals.
  - All LYSO vs LYSO core with CsI (or other cheaper material around the core).
  - Projective geometry of some kind vs non-projective geometry.
  - Need to figure out all pros and cons.

Crystal Layout

- Example: 3x3 projective LYSO core (surrounded by one or two layers of cheaper crystals).



Just an example of a possible projective geometry:

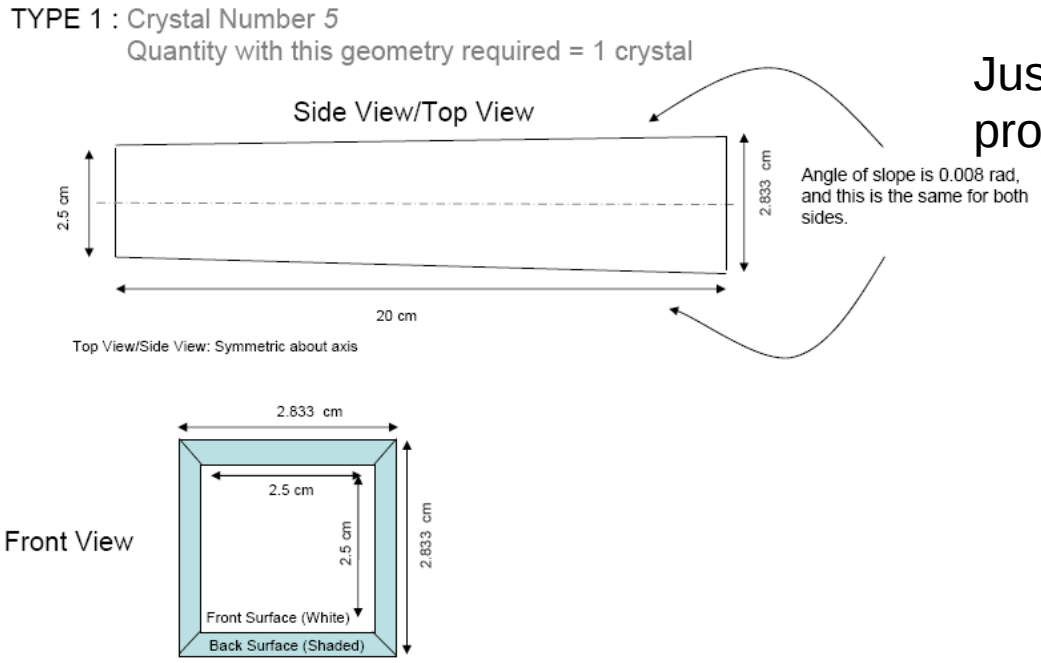
Assumes:

2.5x2.5 cm front crystal surface

'Beamspot' 1.5m from this surface to define projectivity.

Crystal Layout

- Example: 3x3 projective LYSO core (surrounded by one or two layers of cheaper crystals).



Just an example of a possible projective geometry:

Central crystal for a projective geometry.

Pros and Cons

- Projective vs non-projective geometry has *significant* impact on
  - i) cost of crystals
  - ii) timescale for delivery

To Do

- Need to make sure we work to a crystal production timescale that fits in with the test-beam plans (and within whatever budget we ultimately have)

Prototype Issues

Photodetectors

Photodetectors

- Ren Yuan has been using Hamamatsu APDs (from CMS) for lab tests.

- Continue to use this chain for readout vs start to investigate and adopt an alternative (also what is the cost at production level for such a readout?)

Prototype Issues

Readout

Timescales