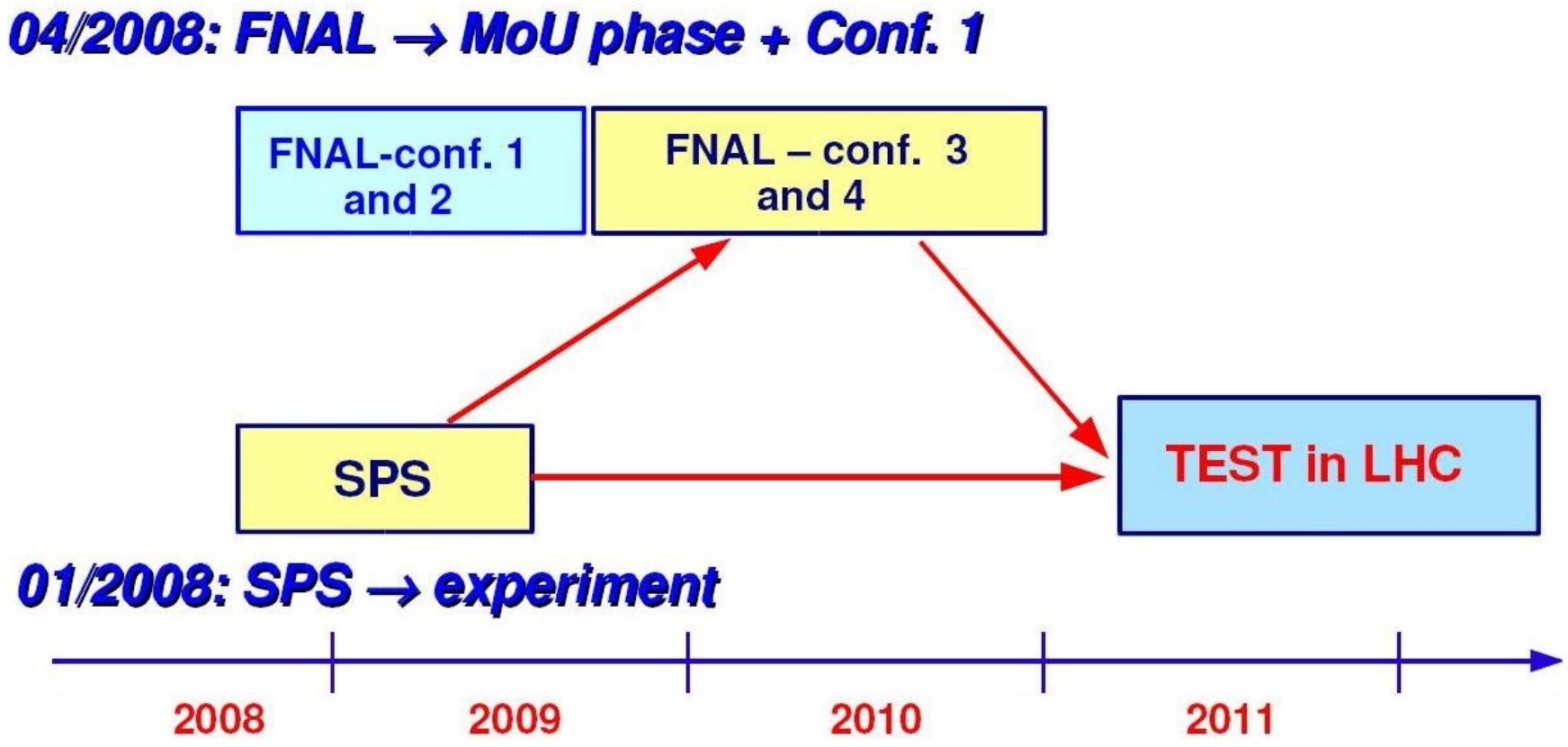
UA9 from the U.S. perspective

S. Peggs, BNL



LARP feeds APL future technologies?

Electron lenses:

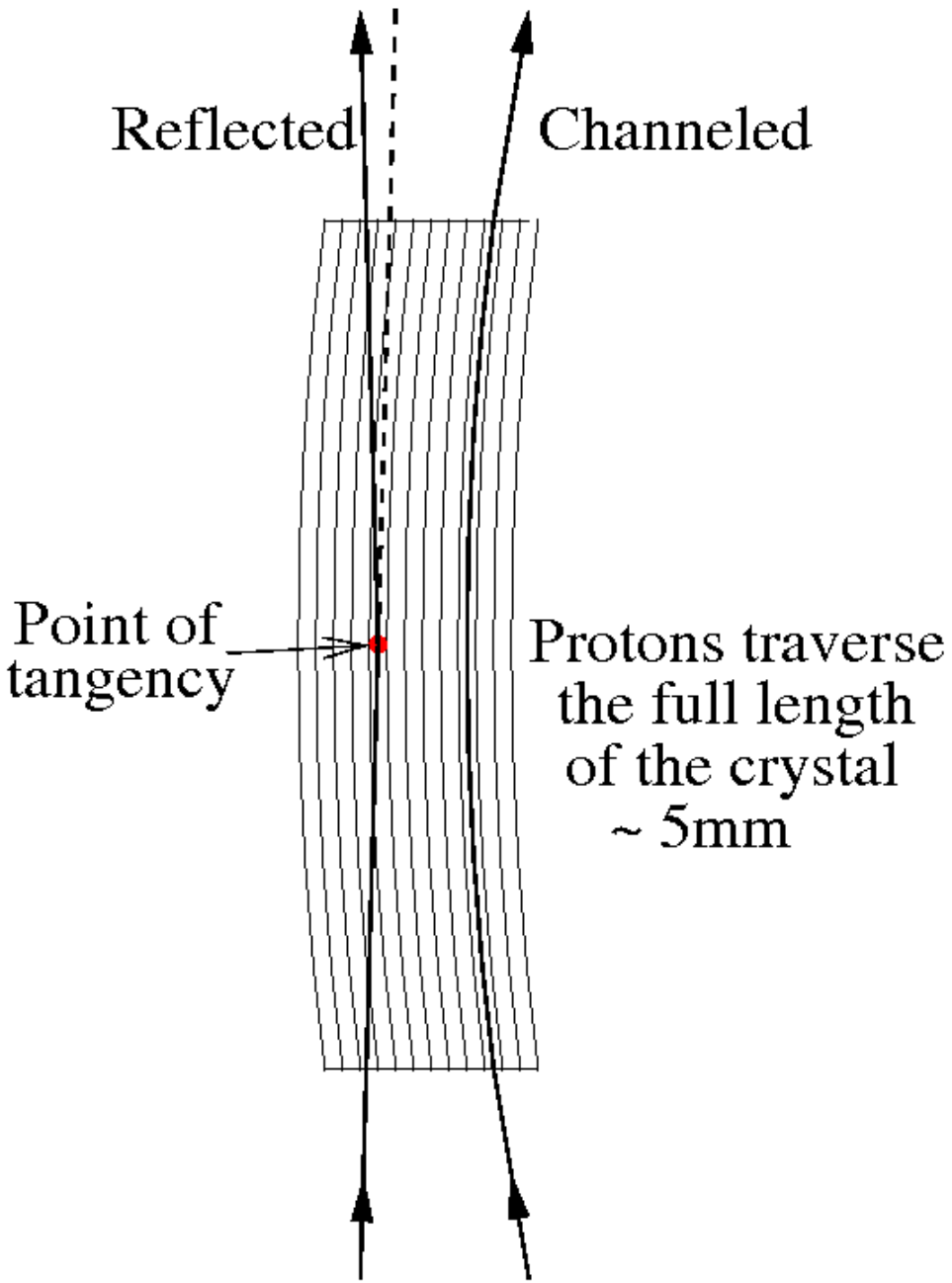
attack beam-beam directly

Crab Cavities:

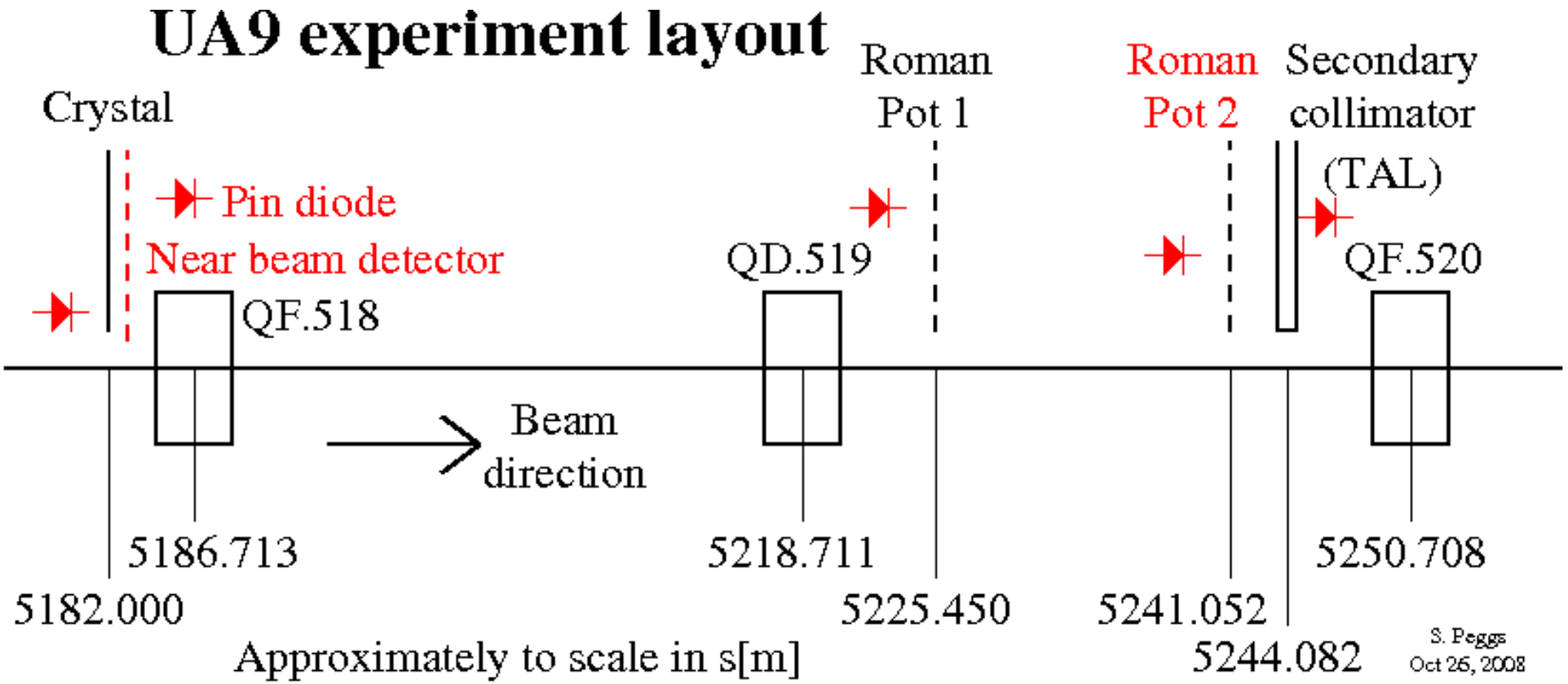
Phase-II IR upgrade?, Growing international interest, eg CARE & Japan.

Crystal collimation:

SPS & Tev experiments UA9 & T980.



3 hot installation topics



Oct 20 Minutes

After multiple discussions between Drees, Markiewicz, Mokhov, Peggs, Prebys, Scandale & Seryi.

1) Roman Pot 2

SLAC to proceed with LARP funded RP2 production, thanks in part to crystal carryforward from FY08 to FY09.

SLAC is confident they will meet the Jan 15 installation deadline (plan A), or mid-February at worst (plan B).

2) Pin diodes

Fermilab to deliver 2 pin diode systems for installation near the crystal (cf Sep 13 email from Peggs to Mokhov).

Mokhov contacts Rick Tesarek for request completion.

Mokhov investigates the possibility of sending as many as 3 more systems, 1 for RP1, 1 for RP2, and 1 for the TAL.

Drees and BNL could help, if called upon.

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3) Near detector

Highly important to install the "near detector" silicon, even if the efficiency of its use is not totally clear.

Scandale is in continued communication with Prest.

4) UA9 & T980 Memoranda of Understanding

Scandale & Lokhov agreed how to cross-sign the 2 MoU's.

Scandale's signature does not officially represent CERN.

5) Team Account

Prebys (re-)opened a LARP Team Account at CERN, fulfilling a precedent-setting $15k invoice.

Oriunno desires access.

Other activities & concerns

a) Schedule uncertainties ....

b) Data analysis

Drees & Robert-Demolaize are preparing data analysis software, using (& exercising) the "common format" agreed for UA9 data – and simulations.

Will the real UA9 be able to see single particles on multiple hits?

c) Energy loss

Multiple scattering (off nuclei) has zero average effect.

Energy loss (atomic electrons) has a systematic average.

dE/dx – like synchrotron radiation – mixes betatron & synchrotron amplitudes "at constant displacement"

Synchro-betatron issues

i) “Pattern recognition”

BNL technical note C-A/AP/342 with S. Shiraishi.

Clear signatures are possible for single-particle multi-hits.

ii) “Grazing function” (see Wednesday presentation)

Final draft paper with V. Previtali.

“Future crystal implementations should always include a grazing function analysis … in design & in error analysis.”

iii) Heating

The natural timescale is one synchrotron period, for betatron heating for deep crystal hits.

Heat instead (or as well) with RF amplitude modulation, in experiment & operation??

Backup slides

The {\it grazing function} g parameterizes the rate of change of total angle with synchrotron amplitude for grazing particles.

The grazing function is a pure optics function, closely related to the slope of the normalized dispersion function, with an ideal value of $g = 0$ at the crystal.

g should be kept small enough that all particles over the relevant synchrotron amplitude range remain within the crystal acceptance angle.

This appears to be reasonable to achieve in practice, especially when crystals are operating in volume reflection mode, and especially at lower energies.

It is not in general necessary to make dispersion (and the dispersion slope) zero at the crystal.

Most important is the need to ensure the absence of significant unmatched betatron and dispersion waves, since they may increase g by an order of magnitude.