

IRMIS Collaboration Meeting

March 9-11

LCLS Undulator Controls

1.04.02

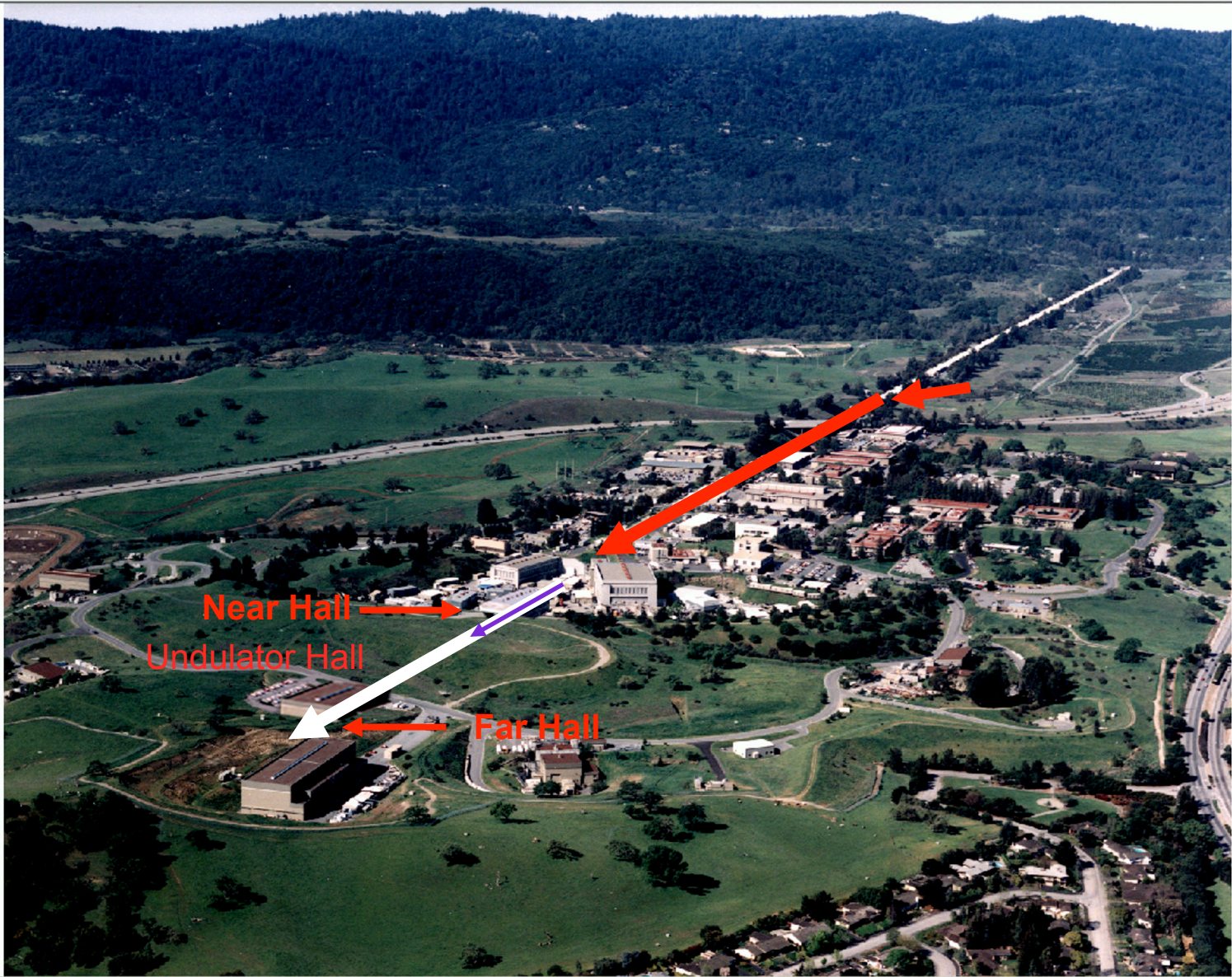
S. Joshua Stein

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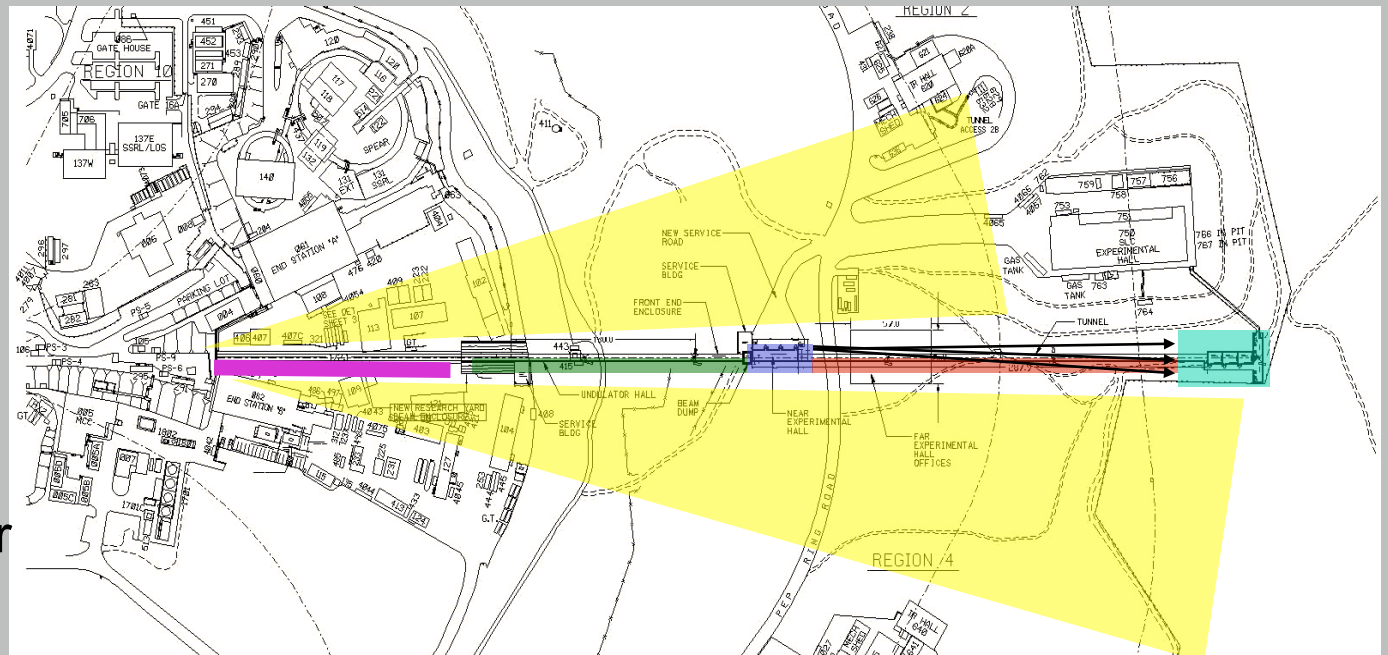
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Conventional Facilities Layout

- Transport
- Undulator
- Hall A
- Tunnel
- Hall B
- 3 Beams/mirror
- Expansion



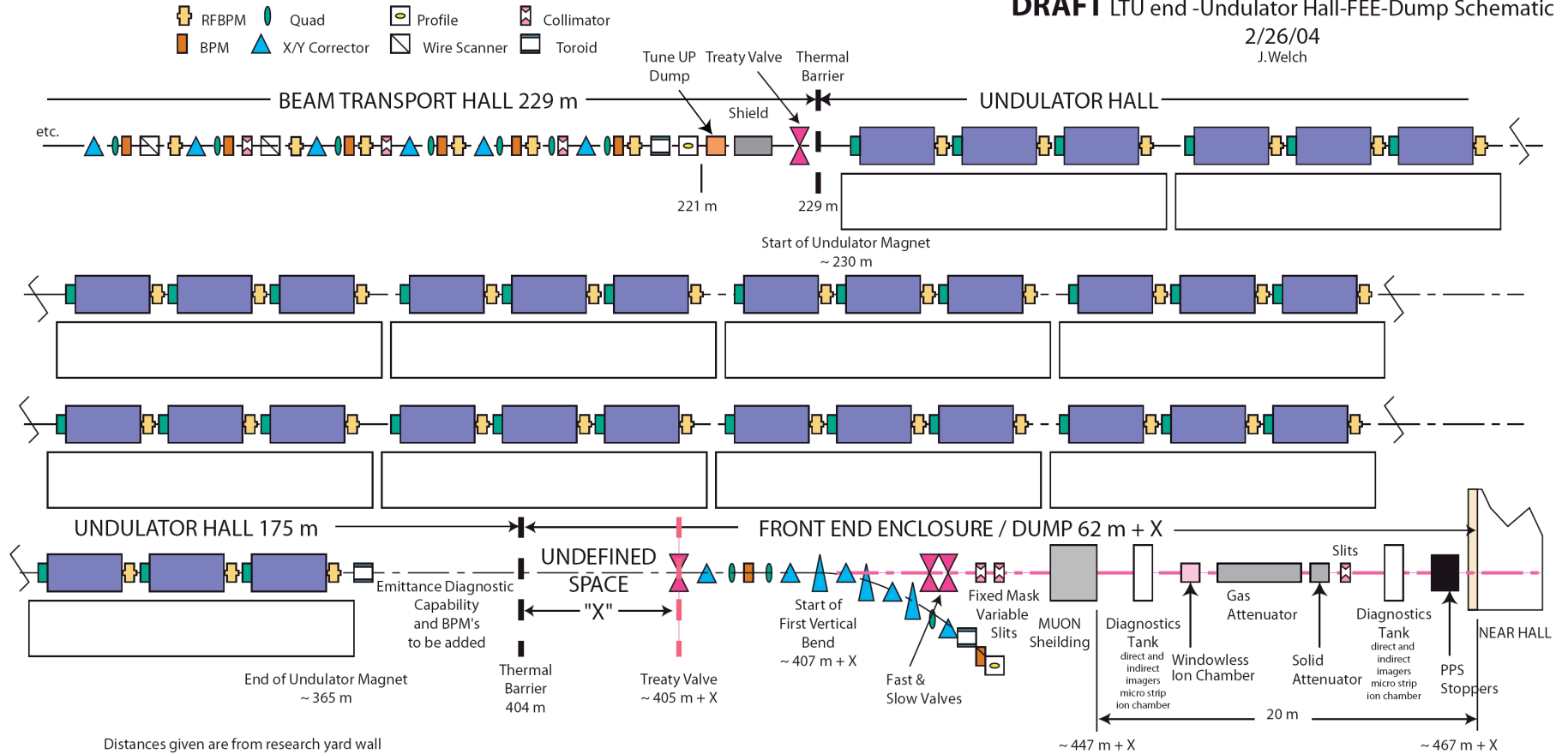
Room for 8 additional undulator lines

Undulator Hall Layout

DRAFT LTU end -Undulator Hall-FEE-Dump Schematic

2/26/04

J.Welch



Undulator Controls : Design Philosophy

- **The LCLS Undulator Control System (UCS) will be designed as a stand-alone control system with interfaces to the existing SLAC control system.**
- **Commercial products will be used whenever possible to avoid duplication of effort and maximize the benefits of product maturity.**
- **When a novel design is required, all attempts will be made to create a “product” which will be useful to all control subsystems of the LCLS.**



Undulator Controls : Interface with SLAC

- **While the Undulator Control System will be self-sufficient, there is by necessity a large amount of communication required between the two control systems.**
 - Software
 - *It is expected that the undulator section will be accessible from anywhere within the LCLS control structure. As such, software interfaces will be designed to accommodate such a requirement, while maintaining the integrity of the individual control systems.*
 - *To leverage the knowledge of the APS controls group staff and minimize unnecessary effort, the EPICS control system platform was chosen for the Undulator Control System. EPICS has a proven track record in the accelerator (and FEL) community.*

Undulator Controls : Software

- **Control software will be run on the EPICS ‘platform’**
 - Defines a low level control schema and implies higher-level software.
- **Whenever possible, existing software will be utilized**
 - Software maturity is an important part of creating a stable control system.
- **Re-use / borrow high level apps from other facilities whenever possible**
- **High level tools will be installed or written to allow flexible ‘science’ software and support the LCLS community as much as possible without compromising the UCS.**
 - Correlated and consistent operator screens
 - Data archiving
 - External software hooks



Undulator Controls : Design documentation

- **It is important to create and maintain system documentation from the beginning of the design process to avoid the “as built” syndrome.**
- **In particular, all installed hardware and software will be logged and tracked via ‘live’ tools such as the APS developed IRMIS suite.**
 - Maintain an integrated, comprehensive and searchable database of:
 - *Installed hardware*
 - *Control software*
 - *Cable*
 - *And all interconnections...*



LCLS Controls : IRMIS Workshop

- **I love workshops - no commitments!**

Basically, “we” want IRMIS to do everything thought of in the past and anything to be thought of in the future



LCLS Controls : IRMIS Desires

- **Everything everybody else presented**
- **Assist in run-time operations including**
 - Fault diagnosis
 - I/O Location
 - PV Tracking
- **Installation**
 - Assist (mandate) cable plant tracking
 - *Creation of cable label nomenclature*
 - *Maintain sane and consistent labeling rules*
 - *Track (physical) cable routing information (?)*
 - Generate routing paths??
 -



LCLS Controls : IRMIS Desires

- **Database creation**
 - Assist (mandate) PV naming rules?
 - Allow easy creation and modification of 'substitution' databases
 - Eliminate (or at least identify) redundant PVs
 - {pv1} and {pv2} both refer to the same I/O point
- **Fault analysis**
 - This (condition) happened
 - *What caused it*
 - *What had a part in causing it*
- **Assist in (gasp) science**
 - Integrate with scientific applications
 - *Determine proper PVs for given applications/scripts*
 - *Allow drag-and-drop analysis configuration*



LCLS Controls : IRMIS Desires

- **“Play nice” with SLAC**
 - Integrate with existing databases for data mining
 - Allow access to tools from arbitrary(!) locations and under various UIs
- **Cause/Effect analysis**
 - If I change this - what is affected, and to what extent?
 - Is it possible to mitigate (or reduce) these ancillary effects?
- **Be ‘user friendly’**
 - It’s too easy to write off documentation tasks. IRMIS tools shouldn’t be usable as an excuse
 - Easy tools encourage use
 - *Much of the effort of keeping the data accurate is still based on humans*



LCLS Controls : IRMIS Desires

- **We will use IRMIS not only after commissioning, but for design**
- **IRMIS -> IRMIATBIS**
 - Yuck - hard to pronounce
 - What about?
 - System for
 - Tabulating
 - Engineering
 - Installation
 - Nomenclature

