

IBIC 2014 SCIENTIFIC HIGHLIGHTS

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Abstract

The SLAC National Accelerator Lab hosted the 3rd International Beam Instrumentation Conference (IBIC 2014) at the Portola Hotel in Monterey, California September 14-18, 2014. The four day scientific program consisted of tutorials, invited talks, contributed talks, poster sessions and industrial sponsor exhibits.

PARTICIPANTS

Conference attendance included 181 participants. Notably less than one third of the participants were from the host continent. Two-thirds of the participants travelled from Asia, South America, and Europe which alone was responsible for half of the attendees. This likely reflects the vibrancy of the European accelerator scene with projects such as the European XFEL, the European Spallation Source, FAIR, and LHC underway.

Table 1: Participation

Country	People	Continent
Japan	13	
People's Republic of China	1	Asia
Republic of Korea	8	
Taiwan	1	
Armenia	1	
Belgium	1	
France	8	
Germany	37	
Italy	8	
Poland	1	Europe
Slovenia	2	
Spain	4	
Sweden	3	
Switzerland	16	
United Kingdom	15	
United States	57	North America 57
Brazil	2	South America
Columbia	1	3
Total	181	

PROGRAM

Tutorials

Both tutorials were very well received. Mike Gruchalla's (Los Alamos National Labs) tutorial "Managing Electromagnetic Interference in Large Instrumentation Environments"[1] provides very useful advice on understanding EMI with many subtle (and not so subtle) examples. He emphasized starting by understanding exactly what you are trying to measure, and then understanding what is not to be included in that measurement and understanding the coupling of both, with a frequent refrain of "draw a picture."

Thomas H. Lee of Stanford University presented "Dark (and Bright) Secrets of RF Design"[2] including some ancient history of RF technology and its ties to accelerators. He says "RF design is a mystery to many engineers" and that "... arcane incantations are needed to make oscillators oscillate and amplifiers amplify (and not vice-versa). Part of the mystery has to do with the many ways that ever-present parasitics undergo surprising impedance transformations, as well as the sometimes counterintuitive ways that nonlinear and time-varying processes can affect noise in amplifiers, oscillators and mixers." Lee starts with a short list of why RF design is hard: parasitics, limited device power gain, tough noise and nonlinearity requirements, and poor device models. A nice overview of relevant topics such as amplifier matching, noise sources, and some odd effects were explained, and many examples followed.

Superconducting Detector Technology

Kent Irwin[3] (SLAC and Stanford University) presented an exciting talk on arrays of superconducting detectors spanning their applications from X-ray beamlines to the recent announcement of detection of evidence for gravitational waves in the early universe. The detectors are arrays of superconducting transition-edge sensors (TES), sensitive to anything which can deposit energy. The signal is amplified by superconducting quantum-interference devices (SQUID), potentially with frequency-division multiplexing based on superconducting resonators whose frequency is shifted by the energy deposited in the TES. These technologies may well be more broadly useful to our community.

Lab Talks and Posters

LHC Beam Instrumentation was presented by Rhodri Jones (CERN). He pointed out the great challenges due to relative inaccessibility and high stored energies in the machine[4]. Weixing Cheng (Brookhaven National Lab) presented "NSLS2 Diagnostic Systems Commissioning

and Measurements” [5] wherein he discussed the start of commissioning. DESY projects were represented with Nicoleta Baboi presenting “Commissioning of the FLASH2 Electron Beam Diagnostics in Respect to its use at the European XFEL”[6] and Dirk Noelle presenting Status of the Standard Diagnostic Systems of the European XFEL”[7].

Henrik Loos (SLAC) presented “LCLS Beam Diagnostics” emphasizing what worked, what did not, and what is new and improved since LCLS turned on in 2009[8]. We heard about commissioning of beam diagnostics for the KEK Compact ERL from Ryota Takai[9].

Rasmus Ischebeck (PSI) in “Overview of Beam Instrumentation Activities for SwissFEL” presented how that project is addressing the gamut of FEL diagnostics, beam charge, position, arrival time, transverse and longitudinal profiles, compression, and loss monitors.[10]

Papers by Topic

The proceedings feature many talks on beam position, profiles, and longitudinal profile measurements as shown in Table 2.

Table 2: Papers by Topic

Classification	Papers
Charge Monitor	9
Loss Monitor	6
Profile	36
Position & Stability	36
Feedbacks	7
General Diagnostics	20
Overview & Commissioning	11
Time Resolved & Synchronization	20
Xray	3
Total	148

REFERENCES

[1] M. Gruchalla, “Managing Electromagnetic Interference in Large Instrumentation Environments”, IBIC’14, Monterey, Sept. 2014, p. 224; <http://www.JACoW.org>

[2] T.H. Lee, “Dark Secrets of RF Design”, IBIC’14, Monterey, Sept. 2014, WETUB1 slides, <http://www.JACoW.org>

[3] K.D. Irwin, “Superconducting Detectors for X-ray Beamline Applications and Cosmology”, IBIC’14, Monterey, Sept. 2014, MOIXB3 slides, <http://www.JACoW.org>

[4] O. R. Jones, The Beam Instrumentation and Diagnostic Challenges for LHC Operation at High

Energy”, IBIC’14, Monterey, Sept. 2014, p. 216; <http://www.JACoW.org>

[5] W.X. Cheng, “NSLS2 Diagnostic Systems Commissioning and Measurements”, IBIC’14, Monterey, Sept. 2014, p. 16; <http://www.JACoW.org>

[6] N. Baboi, “Commissioning of the FLASH2 Electron Beam Diagnostics in Respect to its use at the European XFEL”, IBIC’14, Monterey, Sept. 2014, p. 712; <http://www.JACoW.org>

[7] D. Noelle, “Status of the Standard Diagnostic Systems of the European XFEL”, IBIC’14, Monterey, Sept. 2014, p. 569; <http://www.JACoW.org>

[8] H. Loos, “LCLS Beam Diagnostics”, IBIC’14, Monterey, Sept. 2014, p. 475; <http://www.JACoW.org>

[9] Ryota Takai, “Design and Initial Commissioning of Beam Diagnostics for the KEK Compact ERL”, IBIC’14, Monterey, Sept. 2014, p. 7; <http://www.JACoW.org>

[10] R. Ischebeck, “Overview of Beam Instrumentation Activities for SwissFEL”, IBIC’14, Monterey, Sept. 2014, p. 119; <http://www.JACoW.org>

Pre-Release Snapshot 17-Sep-2015 10:30

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