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Personal

Date of birth: 10th January 1985
Gender: Male
Nationality: Mexican
Marital Status: Married

Education

PhD of Science, Physics December 2014
Departamento de Física
Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional,
(CINVESTAV) Mexico City, Mexico
THESIS - *“Studies of Machine Protections for Fast Crab Cavity Failures in the High Luminosity Large Hadron Collider”*
Supervisors: Dr Frank Zimmermann and Dr. Ricardo López Fernández.

Master of Science, Physics November 2009
Departamento de Física
Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional,
CINVESTAV, Mexico City, Mexico
THESIS - *“Reconstruction of Λ_c^+ in Deep Inelastic Scattering in the H1 detector of HERA”*
Supervisor: Dr. Ricardo López Fernández.

Bachelor of Science, Physics August 2007
Facultad de Ciencias Físico-Matematicas
Universidad Autónoma de Sinaloa, Culiacan, Sinaloa, Mexico
THESIS - *“Selection of Charge Current Events Using Neuronal Network”*
Supervisors: Dr. Ricardo López Fernández and Dr. Ildelfonso León Monzon.

Research Interests:

- Crab Cavities, prototypes, schemes and possible failures.
- Machine protection studies.
- Radio-frequency cavities.
- Beam instrumentation oriented to beam monitor position.

Brief Synopsis of PhD Research:

The studies of machine protection for the Crab Cavity (CC) failures in the Large Hadron Collider (LHC) is a project that has been developed in collaboration with the Accelerator and Beam Physics (ABP) group of the

Beams (BE) department at the European Organization for Nuclear Research (CERN), since I was a summer student in 2010. I developed these studies with Dr. Ricardo López Fernández from Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional (CINVESTAV), Dr. Javier Barranco (CERN), Dr. Rogelio Garcia (CERN), Dr. Rama Calaga (CERN) and Dr. Frank Zimmermann (CERN).

The CCs are a key ingredient of the High Luminosity Large Hadron Collider (HL-LHC) project for increasing the integrated luminosity of the LHC. However, the CCs like any Superconducting Radio-Frequency (SRF) cavity can incur failures. At KEKB (the only collider in which the CCs have been installed), the CCs have exhibited abrupt changes of phase and voltage during a time period of the order of a few LHC turns. These kind of failures are faster than time interval necessary to dump the beam at LHC. Thus, considering the significant stored energy in the LHC and HL-LHC beam, CC failures represent a serious threat in regards to LHC machine protection.

In my research, several CCs failure scenarios (voltage, phase failures) for different CC schemes (Global and Local) were simulated using the computer programs MADX (to install and to calculate the CC voltages) and SixTrack (to track the CCs and make collimation studies). In addition, more realistic beam distributions (known as non-Gaussian) were implemented using data obtained from Van der Meer scan for the luminosity and beam scraping measurements. The CC failures produce beam losses below the safe operation threshold for Gaussian tails, while, for non-Gaussian tails are on the same order of the limit. Additionally, some mitigation strategies are studied for reducing the damage caused by the CC failures.

The test of the CCs prototypes in the SPS in 2017 will allow to develop more realistic CC failure models which will help to obtain more accurate results of CC failures in the HL-LHC.

During my PhD, I have also attended seminars at CERN and CINVESTAV and taken several accelerator schools (CAS, ILC, USPAS, JAS). In parallel, I did a research stay at Centro de Investigaciones Energeticas, Medioambientales y Tecnologicas (CIEMAT) in Madrid, Spain, working in the “shimming magnet” for the compact cyclotron. This project was developed in collaboration with Dr. Felix Javier Barrio De Miguel and Dr. Diego Obradors Campos. Also, at CINVESTAV with Dr. Ricardo López Fernández, we are working in a small project using an electron gun of 10 KeV, the main goal is to obtain experience in hardware. In the summer of 2014, I was working with Dr. John Byrd at Lawrence Berkeley National Laboratory (LBNL), I made simulations of Advanced Photoinjector EXperiment (APEX) Cavity to work in the problem of the dark current and measurements of the longitudinal beam profile at the Advanced Light Source (ALS) using a Streak Camera.

Finally, I am involved in the national project of “Development of Particle Accelerators, A Synchrotron Light Source” (Desarrollo de Aceleradores de Particulas. Fuente de Luz de Sincrotron. Megaproyecto 55329.) in collaboration with several universities and institutes in Mexico (BUAP, CINVESTAV, IMP, UACM, UAS, UASLP, UIA, UJAT, UNAM). Additionally, I am member of Scientific Committee to develop the “Center of Excellence in Nuclear Medical Physics”(Centro de Excelencia en Física Medica Nuclear) in collaboration with the Benemerita Universidad Autonoma de Puebla (BUAP), in Puebla, Mexico.

Research Stays

- “Simulations of APEX Cavity and Streak Camera Measurements in the ALS”, Lawrence Berkeley National Laboratory, Berkeley, U.S.A, July - August 2014.
- “PhD Work for the collaboration BE-ABP on the project for the protection LHC Crab Cavities Machine protection Studies”, CERN, Geneve, Switzerland, September 2011 - November 2013.
- “Multiple Linear Regression Analysis Method for Magnet Shimming in a Classic Cyclotron”, CIEMAT, Madrid, Spain, November - December 2011.
- “Summer student for the collaboration BE-ABP on the project for the protection for future LHC Crab Cavities”, CERN, Geneve, Switzerland, August - September 2010.
- “Summer student for the collaboration Dzero”, Fermilab, Batavia, Illinois, U.S.A, July 2008.

Skills

General skills in research projects and data analysis.

Computing Skills:

Applications: Matlab, Python, Gnuplot and several e-mail packages.

Programming Languages: C++, fortran.

Operating Systems: Linux, Windows.

Other skills

Strong background on Physics.

Experience in Data analysis.

Fluent in Spanish (Native speaker).

Fluent in English.

Conferences, Presentations and Schools Attended

- “12th Particle Accelerator Society of Japan”, Tsuruga, Japan, August 5 - 7, 2015, presented three posters.
- “Reunion CEFMN”, BUAP, Puebla, Mexico, February 16th, 2015, presented a talk.
- “Joint International Accelerator School, Course: Beam Loss and Accelerator Protection”, Newport Beach, U.S.A., November 2014, school.
- “Institutional Seminar of Departamento de Fisica DCI-UG”, UG, Leon, Mexico, October 24th, 2014, presented a talk.
- “Institutional Seminar of Facultad de Ciencias Fisico-Matematicas”, UAS, Culiacan, Mexico, September 3rd, 2014, presented a talk.
- “Institutional Seminar of Facultad de Ciencias Fisico-Matematicas - BUAP”, BUAP, Puebla, Mexico, August 27th, 2014, presented a talk.
- “5th International Particle Accelerator”, Dresden, Germany, June 15 - 20, 2014, presented two posters.
- “The XXVIII Annual Meeting of the Division of Particles and Fields of the Mexican Physics Society”, UNAM, Mexico city, Mexico, May 2014, presented a talk.
- “3rd Joint HiLumi LHC-LARP Annual Meeting”, Daresbury, Daresbury, England, November 2013, presented a talk.
- “4th International Particle Accelerator”, Shanghai, China, May 12 - 17, 2013, presented a poster.
- “United States Particle Accelerator School, Courses: Principles of RF Superconductivity and Principles of Superconducting Linear Accelerators”, Durham, U.S.A., January 2013, school.
- “2nd Joint HiLumi LHC-LARP Annual Meeting”, INFN, Frascati, Italy, November 2012, presented a talk.
- “United States Particle Accelerator School, Course: Accelerator Physics”, Austin, U.S.A., January 2012, school.
- “LHC-CC11 5th LHC Crab Cavity Workshop”, CERN, Geneva, Switzerland, November 2011, presented a talk.
- “High Energies Physics Seminary of ICN”, ICN-UNAM, Mexico city, Mexico, August 2011, presented a talk.
- “The XXV Annual Meeting of the Division of Particles and Fields of the Mexican Physics Society”, UNAM, Mexico city, Mexico, May 2011, presented a talk.
- “Joint US-CERN-JAPAN-RUSSIA School course on Synchrotron Radiation & Free Electron Lasers”, Erice, Italy, April 2011, school.

- “II Mexican Workshop on Accelerators Physics”, Jalisco, Mexico, November 2010, presented a talk.
- “XII Mexican Workshop on Particles and Fields”, Sinaloa, Mexico, November 2009, presented poster.
- “CERN Intermediate Accelerator Physics”, Darmstadt, Germany, October 2009, school.
- “4th International Accelerator School for Linear Colliders”, Beijing, China, September 2009, school.
- “The XXIII Annual Meeting of the Division of Particles and Fields of the Mexican Physics Society”, UNAM, Mexico city. May 2009, conference.
- “Workshop of Introduction to the Instrumentation in Physics”, Iberoamerican University, Mexico City, April 2009, school.
- “5th Latin CERN American School of High Energies Physics”, Recinto Quirama, Antioquia, Colombia, March 2009, school.

Teaching

- Course Instructor of “mini Workshop of Particle Accelerator” in Facultad de Ciencias Fisico-Matematicas, UAS, Culiacan, Mexico, September 8 - 12, 2014.

Journal Articles

- “Simulations of fast crab cavity failures in the high luminosity Large Hadron Collider”, Phys. Rev. ST Accel. Beams **17**, 051001 (2014).

Conference Papers

- “Residual Radiation Measurements by Beam Loss Monitors at J-PARC Main Ring” in Proceedings of the International Beam Instrumentation Conference 2015, Melbourne, Australia, September 13 - 17, 2015, pp.
- “LARGE RESIDUAL RADIATION BUT SMALL BEAM LOSS SIGNAL AT J-PARC MR” in Proceedings of the 12th Particle Accelerator Society of Japan, Tsuruga, Japan, August 5 - 7, 2015, pp.
- “ELECTRON CLOUD OBSERVED DURING DEBUNCHING FOR SLOW BEAM EXTRACTION AT J-PARC MAIN RING” in Proceedings of the 12th Particle Accelerator Society of Japan, Tsuruga, Japan, August 5 - 7, 2015, pp.
- “RESIDUAL RADIATION MEASUREMENT WITH THE BLMS IN J-PARC MR” in Proceedings of the 12th Particle Accelerator Society of Japan, Tsuruga, Japan, August 5 - 7, 2015, pp.
- “Fast Crab Cavity Failures in HL-LHC” in Proceedings of the 5th International Particle Accelerator Conference, Dresden, Germany, June 15 - 20, 2014, pp. 997-999.
- “Preliminary Study of Risks and Failure Scenarios for the High Luminosity Experiments in HL-LHC” in Proceedings of the 5th International Particle Accelerator Conference, Dresden, Germany, June 15 - 20, 2014, pp. 1055-1057.
- “Machine Protection Studies for a Crab Cavity in the LHC” in Proceedings of the 4th International Particle Accelerator Conference, Shanghai, China, May 12-17, 2013, pp. 906-908; Report No. CERN-ACC-2013-0056, 2013.
- “Very Fast LHC Crab Cavity Failures and their Mitigation” in Proceedings of the 3rd International Particle Accelerator Conference, Louisiana, USA, May 20-25, 2012, pp.121-123; Report No.CERN-ATS-2012-106, 2012.
- “Beam Losses Due to Abrupt Crab Cavity Failures in the LHC” in Proceedings of the 11th Particle Accelerator Conference, New York, USA, March 28 - April 1, 2011, pp. 76-78; Report No. EuCARD-CON-2011-004, 2011.

Grants

- Student grant from IPAC'14, June 2014.
- US Department of Energy through the LHC Accelerator Research Program (US-LARP) grant from September 2012 - August 2013.
- The European Particle physics Latin America NETwork (EPLANET) grant November - December 2011.
- Conacyt Mexico through the BEAM project grant from September 2011 - August 2012.

Memberships

- SNI Candidate.
- High Energy Mexican Network (Red de Fisica de Altas Energias in Mexico).
- Scientific Committee to develop the “Center of Excellence in Nuclear Medical Physics” in Puebla, Mexico.

References

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