Souvik Das

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Employment

- **Post-Doctoral Associate**. University of Florida. April 2011 – Present
- **Visiting Fellow**. Cornell University. August 2010 – February 2011
- **Graduate Research Assistant**. Cornell University. January 2006 – August 2010
- **Graduate Teaching Assistant**. Cornell University. August 2003 – December 2006

Education

- **M.S., Ph.D. Experimental High Energy Physics**. Cornell University. August 2003 – August 2010
- **B.Sc. (Honours) Physics**. University of Delhi, St. Stephen's College. June 2000 – July 2003

Research Experience

- **Track-Triggering at CMS.** January 2014 – Current. Leading role in the USCMS software development effort to simulate track-triggering at L1 with Associative Memories for CMS Phase II Upgrades. Developed a new algorithm for track fitting with low latency on FPGAs. Developed a software package to model the timing characteristics of the hardware system. Work performed in direct collaboration with J. Konigsberg, L. Ristori, S. Jindariani and T. Liu. [See **Publications: PostDoctoral**].
- **Search for Resonant Higgs Pair Production at CMS.** October 2012 – Current. Led the search for resonant Higgs pair production in the $b\bar{b}b\bar{b}$ final state and served as Main Contact for the analysis in Run I of the LHC. Work published in Phys. Lett. B, 749:560, 2015. Leading the same search in Run II. Work performed in direct collaboration with J. Konigsberg, A. Rizzi and C. Vernieri. [See **Publications: PostDoctoral**].
- **Search for $H \to b\bar{b}$ at CMS.** April 2011 – October 2012. Developed, maintained and characterized new triggers for the $Z(\nu\bar{\nu})H(b\bar{b})$ channel of the $H \to b\bar{b}$ analysis through 2011 and 2012 of Run I data taking. Results were published in Phys. Lett. B 710:284, 2012, Phys. Lett. B 722:207, 2013 and Phys. Rev. D 89:012003, 2014. Determined the feasibility of an analysis in the $Z(b\bar{b})H(b\bar{b})$ channel for contributing to the $H \to b\bar{b}$ search sensitivity at CMS. Work performed in collaboration with J. Konigsberg. [See **Publications: PostDoctoral**].
- **First Observation of $D_s^{*+} \to D_s^+ e^+ e^-$ at CLEO.** July 2009 – August 2010. Theoretically predicted and observed with 5.3 σ significance the first Dalitz decay in the charm sector, $D_s^{*+} \to D_s^+ e^+ e^-$, using 586 pb^{-1} of e^+e^- data at CLEO. Also measured the branching fraction and found it to be consistent with our theoretical prediction. Results published as my Ph.D. dissertation and Phys. Rev. D 86:072005, 2012. Work supervised by Prof. A. Ryd. [See **Publications: Doctoral**]
- **Online Software and Calibrations for the CMS Pixel Detector**. March 2006 – September 2008. Developed the software framework for the online data acquisition system of the CMS Pixel Detector. Developed calibration algorithms for this 66 million channel semiconductor detector. Performed early commissioning of the software during early runs of CMS. Work supervised by Prof. A. Ryd. [See **Publications: Doctoral**]

- **Heat Conduction in a One-Dimensional Gas of Elastically Colliding Particles of Unequal Masses**. May 2001 – November 2002. Developed computer simulations of atomistic models of heat conduction in one dimension to address fundamental questions about the relation between Fourier's Law of Heat Conduction and the underlying microscopic dynamics. Also studied ratchet-like mechanisms of energy transport in such systems. Work performed at the Indian Institute of Science. Work published in Phys. Rev. E 66:050103(R), 2002 and covered by Nature News. [See **Publications: Undergraduate**]

Awards and Fellowships

- **LPC Distinguished Researcher 2015** awarded by Fermilab and the LPC
- **LPC Distinguished Researcher 2014** awarded by Fermilab and the LPC
- **American Physical Society Student Travel Grant Award 2010** awarded by the Department of Particle and Fields
- **CMS Achievement Award 2008** awarded by the CMS Collaboration Board
- **Kishore Vaigyanik Protsahan Yojana Fellowship 2001–2003** awarded by the Department of Science and Technology of the Government of India, and the Indian Institute of Science

Selected Presentations

- "The Di-Higgs Effort in Run II". December 4, 2015. **Higgs Exotics Workshop**. CERN
- "Searches for resonant pair production of Higgs bosons using the CMS detector". May 4, 2015. **Phenomenology 2015 Symposium**. University of Pittsburgh, PA
- "Searches for Higgs pair production at the CMS Experiment". April 27, 2015. **Higgs Pair Production for Colliders 2015**. Mainz Institute for Theoretical Physics, Germany
- "Search for the production of two Higgs bosons decaying to bottom quarks". November 14, 2014. **US LHC Users Association Meeting 2014**. Argonne National Laboratory, IL
- "Searches for the production of two Higgs bosons using the CMS detector". August 26, 2014. **Particles and Nuclei International Conference 2014**. Deutsches Elektronen-Synchrotron, Hamburg, Germany
- "Search for the production of two Higgs bosons decaying to bottom quarks". 7 August 2014. **Theory-Experiment Whiteboard Talk**. Fermilab, IL
- "$H \to b\bar{b}$ Tools for Supersymmetry Searches". June 13, 2013. **Electroweak Supersymmetry with Higgs**. Fermilab, IL
- "A di-Higgs Resonance Search at the LHC". May 2, 2013. Talk for visit of the **Department of Energy program manager for the Energy Frontier**. Fermilab, IL
- "Search for $D_s^{*+} \to D_s^+ e^+ e^-$". February 13, 2010. **American Physical Society April 2010 Meeting**. Washington D.C.
- "The Status and Performance of the CMS Pixel Detector". March 12, 2009. **Technology and Instrumentation in Particle Physics 2009**. Tsukuba, Japan

Selected Publications and Internal Notes

Post-Doctoral

- CMS Collaboration, "Search for narrow resonant pair production of the Higgs boson in the final state with four bottom quarks", Phys. Lett. B, 749:560, 2015, CMS Physics Analysis Summary (PAS) HIG 2014:013, arXiv:1503.04114
- S. Das, J. Konigsberg, C. Vernieri, A. Rizzi, "Search for di-Higgs resonances decaying to 4 b-jets in pp collisions at 8 TeV", CMS Analysis Note (AN) 2013:227
- S. Das, "An Analytical Track Fitter for rapid least-χ^2 fitting", CMS DN-2015/004
- S. Das, "A $Z(b\bar{b})H(b\bar{b})$ Feasibility Study", CMS AN 2012: 398
- CMS Collaboration, "Search for the standard model Higgs boson produced in association with a W or a Z boson and decaying to bottom quarks", Phys. Rev. D 89:012003, 2014, CMS PAS HIG 2012:044
- CMS VHbb Team 2012, "Search for the SM Higgs Boson Produced in Association with W or Z and Decaying to Bottom Quarks", CMS AN 2012:181
- CMS Collaboration, "Search for a Higgs boson decaying into a b-quark pair and produced in association with b quarks in proton-proton collisions at 7 TeV", Phys. Lett. B 722:207, 2013, CMS PAS HIG 2012:019
- CMS VHbbTeam 2011, "Update of Search for SM Higgs Boson in VH(bb) Using 5 /fb of 7 TeV Collision Data", CMS Analysis Note 2011:430
- CMS Collaboration, "Search for the standard model Higgs boson decaying to bottom quarks in pp collisions at 7 TeV", Phys. Lett. B 710:284, 2012, arXiv:1202.4195, CMS PAS HIG 2011:031, CMS PAS HIG 2011:012
- CMS VHbb Team 2011, "Search for the Standard Model Higgs Boson Produced in Association with a W or Z and Decaying to Bottom Quarks", CMS Analysis Note 2011:240
- CMS Higgs Physics Analysis Group,"Trigger strategies for Higgs searches in 2011", CMS Analysis Note AN-11-065

Doctoral

- CLEO Collaboration 2012, "Observation of the Dalitz decay $D_s^{*+} \to D_s^+ e^+ e^-$", Phys. Rev. D 86: 072005, 2012.
- S. Das, "Observation of the Dalitz Decay of the First Excited State of the Charmed-Strange Meson", Cornell University Ph.D. Dissertation, 2011
- S. Das, A. Ryd, "Search and Observation of the Decay $D_s^{*+} \to D_s^+ e^+ e^-$ and Measurement of the Ratio of Branching Fractions $B(D_s^{*+} \to D_s^+ e^+ e^-)/B(D_s^{*+} \to D_s^+ \gamma)$ at the CLEO-c Experiment", CLEO Internal CBX Note 2010-018
- S. Das, K. Ecklund, B. Kreis, A. Ryd, S. Stroiney, and J. Thompson, "CMS Pixel Online Software and Calibrations", CMS Detector Note 2012:012
- S. Das, "Status and performance of the Compact Muon Solenoid pixel detector", Nucl. Instrum. Meth. A623:147, 2010. CMS Internal Note CR-2009/58

Undergraduate

- S. Das, O. Narayan, and S. Ramaswamy, "Ratchet for energy transport between identical reservoirs", Phys. Rev. E 66, 050103(R), 2002

Peer Review

- Member of the CMS **Analysis Review Committee** for "Search for resonant pair production of Higgs bosons decaying to $b\bar{b}$ and $\tau\bar{\tau}$" CMS EXO-15-008 Analysis. September 2015 – Current
- Member of the CMS **Analysis Review Committee** for "Measurement of the associated production of a Z boson and b jets in pp collisions at 8 TeV". CMS SMP 14-010 Analysis. July 2014 – Current
- Participated in CMS **Institutional Reviews** for "Measurement of the inclusive jet cross section in pp collisions at 2.76 TeV" (CMS-SMP-14-017), "Jet Energy Scale and Resolution in the CMS Experiment" (CMS-JME-13-004-001), "Pseudorapidity distribution of charged hadrons in proton-proton collisions at 13 TeV" (arXiv:1507.05915, "Search for lepton-flavor-violating decays of the Higgs boson to electrons and tau leptons, and to electrons and muons, at 8 TeV" (CMS-PAS-HIG-14-040), "Angular coefficients of Z bosons produced in pp collisions at 8 TeV and decaying to $\mu^+\mu^-$ as a function of transverse momentum and rapidity" (Phys. Lett. B, 750:154, 2015), "Identification techniques for highly boosted W bosons that decay into hadrons" (J. High Energy Phys. 12 (2014) 017), "Exclusive $\gamma\gamma \to \mu^+\mu^-$ production in proton-proton collisions at 7 TeV" (J. High Energy Phys. 01 (2012) 052), "Measurement of the inclusive Z cross section via decays to tau pairs in pp collisions at 7 TeV" (J. High Energy Phys. 08 (2011) 117).

Mentoring

- **Mentored an undergradate student** from the South Dakota School of Mines and Technology through the **Fermilab Quarknet** intership program in June – August 2015
- **Mentored a University of Florida Ph.D. student** who graduated in April 2015
- **Instructed Ph.D. students** at the CMS Data Analysis School of 2014 and 2015 in searching for the Higgs boson and triggering at the CMS experiment
- **Teaching Assistant** at Cornell University. Involved delivering several small classroom lectures in a week, preparing experiments, and grading students. Heat and Electromagnetism in Fall 2005 with Prof. L. Gibbons, General Physics in Summer 2004 with Prof. A. Giambattista, Waves, Optics and Particles in Spring 2004 with Prof. H. Tye, Classical Mechanics in Fall 2004 with Prof. P. Krasicky, Heat and Electromagnetism in Summer 2003 with Prof. R. Wheeler, Heat and Electromagnetism in Spring 2003 with Prof. A. LeClair, and Heat and Electromagnetism in Fall 2003 with Prof. V. Elser

In the Media, Physics Outreach and Organization

- **Fermilab Today** featured the $X \to HH \to b\bar{b}b\bar{b}$ search led by me
- **Advocated for science funding** to Representatives and Senators in Washington D.C. with the Fermilab User's Executive Committee in March 2015
- Coordinator for the **Fermilab LPC Coffee Hour** since January 2015
- Delivered several outreach talks on the Large Hadron Collider and particle physics to schools and universities between 2009 and 2014. The presentation is now an official outreach resource on the CMS website
- **CMS Times**, published online by CERN, described my research in instrumentation of the CMS detector
- **CMS Times** featured my experience as a Ph.D. student at CERN
- **Nature News** featured research led by me in theoretical condensed matter physics