



## 10<sup>th</sup> Albany Nanotechnology Symposium Program South Auditorium, SUNY Polytechnic Institute

257 Fuller Rd, Albany NY - 12203

Wednesday, Nov 16<sup>th</sup>, 2016 (9:00 AM – 5:00 PM)

### General information

Please check in at the South auditorium rotunda as soon as you arrive.

Please see Pg 7 for the site map/parking information.

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## Keynote Address (10:00 – 11:00 AM)

### Jerry M. Chow

Manager, Experimental Quantum Computing, IBM Research



### “Quantum error detection, high-fidelity controls, and experiencing other things quantum”

#### Abstract

Fault tolerant quantum computing is possible by employing quantum error correction techniques. In this talk I will describe an implementation of various small quantum codes using lithographically defined superconducting qubits in latticed arrangements. These codes explore a new area of quantum information processing, including the detection of full quantum errors and the encoding of a logical qubit. Our experiments require highly coherent qubits, high quality quantum operations implementing the detecting circuit, and high quality independent qubit measurements. Looking beyond further, there remains both theoretical and experimental control hurdles which must be overcome to build verifiably reliable quantum networks of qubits. I will present some experiments which point towards these important questions and give proposals for future integration capability, measurement integration, and scalable control architectures. The focus will be on a variety of questions which will increasingly become important as the field moves towards a larger network of qubits.

#### Bio

**Dr. Jerry M. Chow** is the Manager of the Experimental Quantum Computing group at IBM. His technical expertise is in the area of design, measurement, and integration of superconducting quantum devices. Chow graduated magna cum laude with a B.A. in physics and M.S. in applied mathematics from Harvard University (2005) and subsequently a Ph.D in physics from Yale University (2010). He was awarded a NSF Graduate Research Fellowship for his study at Yale, where he worked on implementing the first quantum processor with superconducting qubits in Prof. Rob Schoelkopf’s group. He joined IBM Research as a Research Staff Member in 2010. In 2012 he was recognized in the Forbes 30 under 30 Technology list.

**PROGRAM**

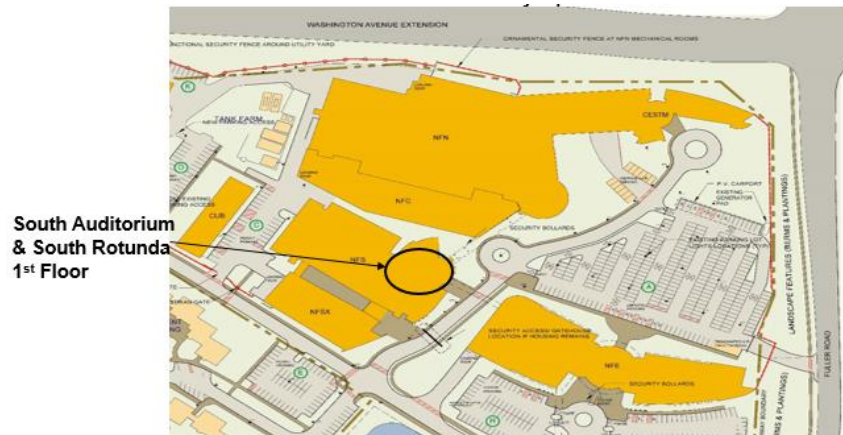
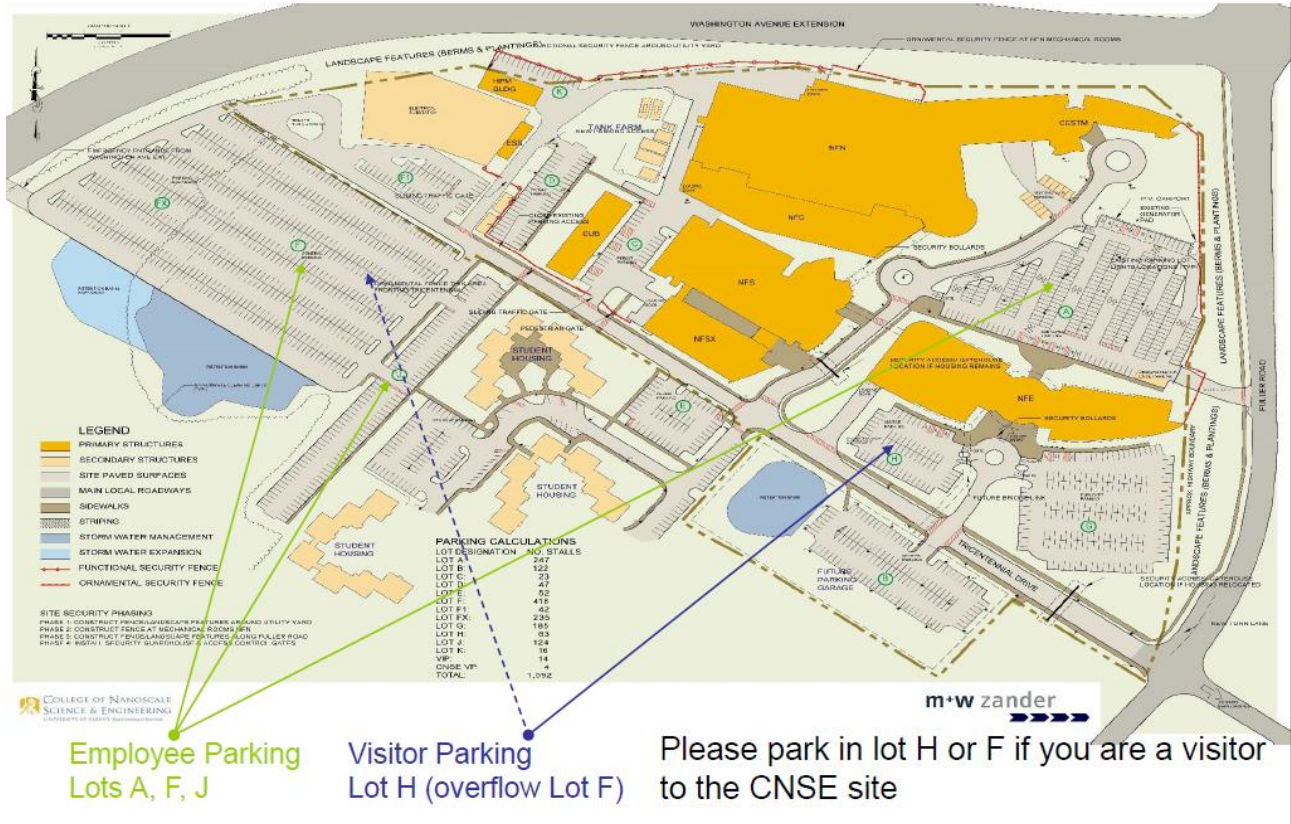
8:30-9:00 AM	Welcome, Check-in & Poster setup
9:00-10:00 AM	Closed poster session – Presenters, Judges & invitees
10:00-10:15 AM	<b>Welcome:</b> Indira Seshadri, Chair ANTS-2016 & Tom Gow Jr, Director, Albany Nanotech Operations, IBM
10:00-11:00 AM	<b>Keynote Address</b> Jerry M. Chow, Manager, Experimental Quantum Computing
11:15-12:35 PM	<b>Session I - Lightning talks</b>
11:15-11:20 AM	Kim Morris <b>'How Less Can Be More in Semiconductor Research Operations'</b>
11:22-11:27 AM	Xunyuan Zhang, Huai Huang, Raghuvier Patlolla, Frank Mont, E. Todd Ryan, Cathy Labelle, Donald Canaperi, Theodoros Standaert and Chao-Kun Hu <b>'Surface engineering method to form low resistance ruthenium interconnect'</b>
11:29-11:34 AM	Marissa Guttenberg, Devina Puri, Amirreza Samarbakhsh, Alison Elder, Günter Oberdörster and Sara Brenner <b>'Enhanced darkfield microscopy for direct visualization of metal oxide nanoparticles in tissues following inhalation exposure' (Student)</b>
11:36-11:41 AM	Pei Zhao, Edmund Banghart, Shesh Mani Pandey, Xiaoli He, Manoj Joshi, Luke Lee and Srikanth Samavedam <b>'Influence of stress induced CT local layout effect (LLE) on 14nm FinFET'</b>
11:43-11:48 AM	Ming Yin, Derek Leu, Toshiaki Kirihata, Janakiraman Viraraghavan, Balaji Jayaraman, Alberto Cestero, John Golz, Rajesh Tummuru, Ramesh Raghavan, Dan Moy, Thejas Kempanna, Faraz Khan and Subramanian Iyer <b>'Logic Embedded Multi-Time-Programmable Memory Based On Hi-K Charge Trap With No Added Process Complexity'</b>
11:50-11:55 AM	Logan Butt, Lauren Sfakis, Matthew Strohmayer, Timothy Masiello, Atul Dhall, Madhubhani Hemachandra, Sonia Voiculescu, Yarong Wang, David Entenberg, John Condeelis and James Castracane <b>'Light-activated microfluidics systems for real-time in vivo imaging of cancer metastasis' (Student)</b>
11:57-12:02 PM	Erik Milosevic and Daniel Gall <b>'Reduction in Cu thin film resistivity using an Al-oxide surface layer' (Student)</b>
12:04-12:09 PM	Venkat Balagurusamy and Joseph Ligman <b>'Cellular phone based detection of genetic material (DNA or RNA) for identifying flu virus and other pathogens'</b>
12:11-12:16 PM	Bianzhu Fu, Michael Gribelyuk, Frieder Baumann, Laurent Dumas and Chao Fang <b>'The characterization of semiconductor nano-devices: from 2D to 3D'</b>
12:18-12:23 PM	Sarah Ashmeg and Eric Eisenbraun <b>'Metal-filled carbon nanotubes for targeted radiotherapy: A feasibility study' (Student)</b>
12:25-12:30 PM	Juntao Li, Shay Reboh, Robin Chao, Nicolas Loubet, Michael Guillorn, Tenko Yamashita and John Gaudiello <b>'Nanobeam Diffraction and Geometric Phase Analysis for Strain Measurements in Si/SiGe Nanosheet Structures'</b>
	<b>Pizza lunch (Champlain CR, IBM Suite)</b>
1:30-3:00 PM	<b>Session II - Lightning talks</b>
1:30-1:35 PM	Gregory Johnson <b>'Multi-Photon OBIC for Device characterization and Defect Localization'</b>
1:37-1:42 PM	Katherine Dropiewski, Michael Yakimov, Vadim Tokranov, Pavel Murat and Yongqiang <b>'An Ultrafast Quantum Dot Scintillation Detector' (Student)</b>

1:44-1:49 PM	Zhigang Song, Laura Safran, Steve Lucarini, David Clark and Brett Engel <b>'Systematic Characterization and Analysis Methodology for A Non-defect Failure'</b>
1:51-1:56 PM	Mona Ebrish <b>'Understanding graphene interface with different dielectrics in a local back gated graphene field-effect transistors'</b>
1:58-2:03 PM	Huan Hu, Stacey Gifford, Pablo Meyer, Sungcheol Kim and Gustavo Stolovitzky <b>'Bio-Inspired Silicon Nanospikes Fabricated by Metal-Assisted Chemical Etching for Antibacterial Surfaces' (Student)</b>
2:05-2:10 PM	Hao Tang, Shuo Zhao, Jennifer Fullam, Jessica Striss, Roger Cornell, Chanro Park, Lei Sun, Min Gyu Sung, Richard Johnson, Alex Hubbard, Sivananda Kanakasabapathy, John Arnold, Nelson Felix and Ruilong Xie <b>'Deciphering Overlay-Process Interactions'</b>
2:12-2:17 PM	Yangzi Tian, Erin Maloney, Karen Torrejon and Yubing Xie <b>'Fluidic Device Fabrication for Schlemm's Canal Cell Differentiation' (Student)</b>
2:19-2:24 PM	Loma Vaishnav, Leigh Anne Clevenger, Robinhsinku Chao, Stefania Axo, Yang Liu, Indira Seshadri, Larry Clevenger and Nicole Saulnier <b>'Cognitive Build: Smartwatch Blackbox'</b>
2:26-2:31 PM	Adra Carr, Martin Frank, Jean Jordan-Sweet, David Muir, Beatriz Moreno, Takashi Ando, Xiao Sun, Cheng-Wei Cheng, Adam Pyzyna, Vijay Narayanan and Christian Lavoie <b>'Stabilizing ferroelectric HfO<sub>2</sub>: Phase formation studied by temperature-dependent synchrotron X-ray diffraction'</b>
2:33-2:38 PM	Terence Kane and Michael P Tenney <b>'Enhanced Localization of Non Linear Defects in 7nm BEOL Interconnects'</b>
2:40-2:45 PM	Girish Malladi, Mengbing Huang and Hassaram Bakhru <b>'Current injection dependent magnetoresistance of Nickel nanoparticles embedded in single crystal Si' (Student)</b>
2:47-2:52 PM	Tianji Zhou, Pengyuan Zheng and Daniel Gall <b>'Electron Scattering at Rough Metal Surfaces: First-Principles Results' (Student)</b>
	<b>Coffee Break</b>
<b>3:15-4:30 PM</b>	<b>Public Poster Session</b>
1	Terence Kane and Michael P Tenney 'Enhanced Localization of Non Linear Defects in 7nm BEOL Interconnects'
2	Zhengqing Qi 'Impact of EUV Mask Defectivity on Technology Decision Making'
3	Ming Yin, Derek Leu, Toshiaki Kirihata, Janakiraman Viraraghavan, Balaji Jayaraman, Alberto Cestero, John Golz, Rajesh Tummuru, Ramesh Raghavan, Dan Moy, Thejas Kempanna, Faraz Khan and Subramanian Iyer 'Logic Embedded Multi-Time-Programmable Memory Based On Hi-K Charge Trap With No Added Process Complexity'
4	Dong-Ick Lee, Hojin Kim, Liu Jiang, Wei Zhao, Jin Cho, Ivan Chakarov, Francis Benistant, Owen Hu and Srikanth Samavedam 'The 3D FINFET process emulation of PFET contact interfacial area maximization by the optimization of SDB shallow trench dimensions'
5	Xunyuan Zhang, Huai Huang, Raghuvveer Patlolla, Frank Mont, E. Todd Ryan, Cathy Labelle, Donald Canaperi, Theodorus Standaert and Chao-Kun Hu 'Surface engineering method to form low resistance ruthenium interconnect'
6	Rishikesh Krishnan, Yiheng Xu, David Brunco, Rachel Gantt, Gregory Dibello, Joseph Shepard, Srikumar Raman, Thirumalesh Bannuru, Jungchan Lee, Samphy Hong, Benjamin Colombeau, Benjamin Moser, Bharat Krishnan, Maria Galliano and David Collins 'Shallow Trench Isolation for 7nm CMOS Technology Node and Beyond: Challenges and Solutions'
7	Hong Jin Kim 'Nanoscale Metal Flake Defect Formation Mechanism in sub 14nm Replacement Metal Gate Process'
8-Student	Logan Butt, Lauren Sfakis, Matthew Strohmayer, Timothy Masiello, Atul Dhall, Madhubhani Hemachandra, Sonia Voiculescu, Yarong Wang, David Entenberg, John Condeelis and James Castracane 'Light-activated microfluidics systems for real-time in vivo imaging of cancer metastasis'

9-Student	Karsten Beckmann, Joshua Holt, Joseph Van-Nostrand and Nathaniel Cady 'Impact of bottom electrode-dielectric interface on RRAM switching behavior'
10	Bianzhu Fu, Michael Gribelyuk, Frieder Baumann, Laurent Dumas and Chao Fang 'The characterization of semiconductor nano-devices: from 2D to 3D'
11-Student	Subha Chakraborty, Daniel Wilkinson, Girish Malladi and Mengbing Huang 'Study of ionoluminescence from organic scintillator thin films for charge particle sensing'
12	Zhigang Song, Laura Safran, Steve Lucarini, David Clark and Brett Engel 'Systematic Characterization and Analysis Methodology for A Non-defect Failure'
14-Student	Sarah Ashmeg and Eric Eisenbraun 'METAL-FILLED CARBON NANOTUBES FOR TARGETED RADIOTHERAPY: A FEASIBILITY STUDY'
15-Student	Tristin Schwartz, Nathaniel Cady and Juan Andres Melendez 'High-Throughput SPR Sensors for Matrix Metalloproteinases'
16	Pei Zhao, Edmund Banghart, Shesh Mani Pandey, Xiaoli He, Manoj Joshi, Luke Lee and Srikanth Samavedam 'Influence of stress induced CT local layout effect (LLE) on 14nm FinFET'
17	Dewei Xu, Tao Song, Cole Zemke and Rod Augur 'Refined Modelling/Analysis on BEOL RC Performance for 7nm Nodes and Beyond'
18	Kim Morris 'How Less Can Be More in Semiconductor Research Operations'
19	Natesan Venkateswaran and Leon Stok 'IBM Electronic Design Automation – An Overview'
20	Venkat Balagurusamy and Joseph Ligman 'Cellular phone based detection of genetic material (DNA or RNA) for identifying flu virus and other pathogens'
21	Tianji Zhou, Pengyuan Zheng and Daniel Gall 'Electron Scattering at Rough Metal Surfaces: First-Principles Results'
22-Student	Erik Milosevic and Daniel Gall 'Reduction in Cu thin film resistivity using an Al-oxide surface layer'
23	Hao Tang, Shuo Zhao, Jennifer Fullam, Jessica Striss, Roger Cornell, Chanro Park, Lei Sun, Min Gyu Sung, Richard Johnson, Alex Hubbard, Sivananda Kanakasabapathy, John Arnold, Nelson Felix and Ruilong Xie 'Deciphering Overlay-Process Interactions'
24-Student	Avinash Londhe, Alexandre Bergeron, Emma Eisenbaun, Catherine Sramek, Magnus Bergkvist and Benoit Boivin 'Molecular characterization of Protein Tyrosine Phosphatase 1B with scFv45, a conformation-sensor nanobody.'
25	Sanjay Mehta, Richard Conti, Thamarai Devarajan and Yiping Yao 'UV Cure Enabled Robust STI Oxide Gap Fill Solution for Thermally Limited Flow in Advanced Logic Devices'
26	Gregory Johnson 'Electron Beam Induced Resistance Change for Defect Localization and Device Characterization'
27	Gregory Johnson 'Multi-Photon OBIC for Device characterization and Defect Localization'
28-Student	Marissa Guttenberg, Devina Puri, Amirreza Samarbakhsh, Alison Elder, Günter Oberdörster and Sara Brenner 'Title: Enhanced darkfield microscopy for direct visualization of metal oxide nanoparticles in tissues following inhalation exposure'
29-Student	Huan Hu, Stacey Gifford, Pablo Meyer, Sungcheol Kim and Gustavo Stolovitzky 'Bio-Inspired Silicon Nanospikes Fabricated by Metal-Assisted Chemical Etching for Antibacterial Surfaces'
30	Juntao Li, Shay Reboh, Robin Chao, Nicolas Loubet, Michael Guillorn, Tenko Yamashita and John Gaudiello 'Nanobeam Diffraction and Geometric Phase Analysis for Strain Measurements in Si/SiGe Nanosheet Structures'
31	Niaz Mahmud, Avyaya Jayanthi Narasimham and J.R. Lloyd '1/f Noise Analysis of Hafnium Oxide based ReRAM devices using AC+DC measurement technique'

32-Student	Avyaya Jayanthi Narasimham, Meng Zhu, Prasanna Khare and Vincent Labella 'In-plane current induced spin orbit effects in nanometer scale Hall bar of $\beta$ -W/Ta/CoFeB/MgO/Ta multilayers'
33-Student	Jennifer Passage, Austin Thomas and James Lloyd 'An Investigation into Nucleation and Growth of Void Formation in the Electromigration Failure.'
34-Student	Yangzi Tian, Erin Maloney, Karen Torrejon and Yubing Xie 'Fluidic Device Fabrication for Schlemm's Canal Cell Differentiation'
35-Student	Katherine Dropiewski, Michael Yakimov, Vadim Tokranov, Pavel Murat and Yongqiang An 'Ultrafast Quantum Dot Scintillation Detector'
36-Student	Austin Thomas, Jennifer Passage and James Lloyd 'TDDB Testing for Ultra Low Frequency Relaxation in Low-K Dielectrics'
37-Student	Girish Malladi, Mengbing Huang and Hassaram Bakhru 'Current injection dependent magnetoresistance of Nickel nanoparticles embedded in single crystal Si'
38	Mona Ebrish 'Understanding graphene interface with different dielectrics in a local back gated graphene field-effect transistors'
39	Adra Carr, Martin Frank, Jean Jordan-Sweet, David Muir, Beatriz Moreno, Takashi Ando, Xiao Sun, Cheng-Wei Cheng, Adam Pyzyna, Vijay Narayanan and Christian Lavoie 'Stabilizing ferroelectric HfO <sub>2</sub> : Phase formation studied by temperature-dependent synchrotron X-ray diffraction'
40	Loma Vaishnav, Leigh Anne Clevenger, Robinhsinku Chao, Stefania Axo, Yang Liu, Indira Seshadri, Larry Clevenger and Nicole Saulnier 'Cognitive Build: Smartwatch Blackbox'
41	Heng Wu 'Demonstration of Ge CMOS Circuits by Recessed Channel and Source/Drain'
42	Peng Xu 'Hybrid Fin reveal for tight Fin Pitch Technologies'
43	Miaomiao Wang, James Stathis, Chiayu Chen, Zuoguang Liu and Tenko Tamashita 'Separation of Interface States and Electron Trapping for Hot Carrier Degradation in Replacement Metal Gate n-FinFETs'
<b>4:00-5:00 PM</b>	<b>Awards</b>

# ANTS 2016 Symposium Map of SUNY Polytechnic Institute 257 Fuller Rd. Albany Ny 12203



Please check-in directly at the south auditorium entrance, registration is open 8:30 AM – 10:00 AM