

# QEC Summer School Schedule

As of June 7 subject to change.

| Week 1  |   |   |                                     |  |  |   |  |  |     |   |
|---|---|---|-------------------------------------|--|--|---|--|--|-----|---|
| QEC Foundations<br>Bosonic Code Foundations<br>Programming QEC Decoders |   |   |                                     |  |  |   |  |  |     |   |
| Time  | Activity  | Location/Room                               | Mon                                 | Tue  | Wed  | Thr   | Fri  | Sat  | Sun |   |
|   |   |   | 4                                   | 5  | 6  | 7   | 8  | 9  | 10  |   |
| 7:00AM - 8:55AM   | Breakfast                                       | Biddle Mansion - Winter Palace/West Terrace | Students Arrive                     | Breakfast  |  |   |  |  |     | Study/Off<br><br>Breakfast: 7:00AM - 9:30AM<br>Lunch: 12:00PM - 1:30PM<br>Dinner: 6:00PM - 9:00PM |
| 9:00AM - 10:30AM  | Lecture I                                       | New York                                    |                                     | Meet @ 8:45AM for First Day Logistics<br><br>QEC Foundations<br>Steve Flammia, AWS           | Programming QEC Decoders<br>James Wootton, IBM<br>Quantum                | Bosonic Code Foundations<br>Shruti Puri, Yale University<br>Arne Grimsmo, AWS                           | Bosonic Code Foundations<br>Shruti Puri, Yale University<br>Arne Grimsmo, AWS                | QEC Foundations<br>Steve Flammia, AWS  |     |   |
| 10:30AM - 11:00AM   | Morning Tea Break                               | Atrium Lobby                                |                                     | Morning Tea Break  |  |   |  |  |     |   |
| 11:00AM - 12:30PM   | Lecture II                                      | New York                                    |                                     | Bosonic Code Foundations<br>Shruti Puri, Yale University<br>Arne Grimsmo, AWS                | QEC Foundations<br>Steve Flammia, AWS                                    | QEC Foundations<br>Steve Flammia, AWS   | Programming QEC Decoders<br>James Wootton, IBM<br>Quantum                                    | Bosonic Code Foundations<br>Shruti Puri, Yale University<br>Arne Grimsmo, AWS                            |     |   |
| 12:30PM - 1:25PM  | Lunch   | Biddle Mansion - Winter Palace/West Terrace |                                     | Lunch  |  |   |  |  |     |   |
| 1:30PM - 2:00PM   | Q&A Sessions                                    | Sunnyside                                   |                                     | Q&A Session<br>QEC Foundations<br>Steve Flammia, AWS   | Q&A Session<br>Programming QEC Decoders<br>James Wootton, IBM<br>Quantum | Q&A Session<br>Bosonic Code Foundations<br>Shruti Puri, Yale University<br>Arne Grimsmo, AWS            | Q&A Session<br>Bosonic Code Foundations<br>Shruti Puri, Yale University<br>Arne Grimsmo, AWS | Q&A Session<br>QEC Foundations<br>Steve Flammia, AWS   |     |   |
| 2:00PM - 2:30PM   |   | Lyndhurst                                   |                                     | Q&A Session<br>Bosonic Code Foundations<br>Shruti Puri, Yale University<br>Arne Grimsmo, AWS | Q&A Session<br>QEC Foundations<br>Steve Flammia, AWS                     | Q&A Session<br>QEC Foundations<br>Steve Flammia, AWS  | Q&A Session<br>Programming QEC Decoders<br>James Wootton, IBM<br>Quantum                     | Q&A Session<br>Bosonic Code Foundations<br>Shruti Puri, Yale University<br>Arne Grimsmo, AWS             |     |   |
| 2:30PM - 4:30PM   | Unstructured Time                               | N/A   |                                     | Unstructured Time/<br>Office Hours with Admin Team<br>for on-site support                    | Unstructured Time  |   |  |  |     |   |
| 4:30PM - 5:00PM   | Open Problems,<br>Student Talks,<br>Crazy Ideas | New York                                    |                                     | Unstructured Time  | Unstructured Time  | Open Problems - Part I<br>QEC Foundations<br>Steve Flammia, AWS   | Crazy Ideas Session<br>IDA Rules<br>Drew Vandeth, IBM Quantum                                | Open Problems - Part II<br>Bosonic Code Foundations<br>Shruti Puri, Yale University<br>Arne Grimsmo, AWS |     |   |
| 5:00PM - 5:30PM   |   |   |                                     |  |  | Open Problems - Part I<br>Bosonic Code Foundations<br>Shruti Puri, Yale University<br>Arne Grimsmo, AWS |  | Open Problems - Part II<br>QEC Foundations<br>Steve Flammia, AWS   |     |   |
| 5:30PM - 6:00PM   | Unstructured Time                               | N/A   |                                     | Unstructured Time  |  |   |  |  |     |   |
| 6:00PM - 6:55PM   | Dinner  | Biddle Mansion - Winter Palace/West Terrace | 4th of July Event<br>@ Duke Terrace | Opening Dinner<br>@ Mary Duke Ballroom   | Dinner   | Social Event:<br>Women in Quantum Social &<br>Dinner  | Dinner   |  |     |   |
| 7:00PM - 8:00PM   | Guest Lectures/Social Time                      | New York                                    |                                     | Keynote Speaker,<br>Daniel Gottesman, UMD<br>Mary Duke Ballroom                              | Guest Lecture<br>Natalie Brown, Quantinuum                               | @ West Terrace  | Guest Lecture<br>Liang Jiang, The University of<br>Chicago                                   | Unstructured Time  |     |   |
| 8:00PM - 9:00PM   | Social  | Atrium Lobby                                |                                     | Speaker Social   | Speaker Social   |   | Speaker Social   |  |     |   |

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| Week 2   |   |                            |  |   |  |   |   |  |   |
|--|---|----------------------------|--|---|--|---|---|--|---|
| Fault Tolerance - Logistical Gates<br>Experimental QEC - Bosonic Codes<br>Programming QEC Decoders |   |                            |  |   |  |   |   |  |   |
| Time   | Activity                                  | Location/Room              | Mon  | Tue   | Wed  | Thr   | Fri   | Sat  | Sun   |
|  |   |                            | 11   | 12  | 13   | 14  | 15  | 16   | 17  |
| 7:00AM - 8:55AM  | Breakfast                                 | Winter Palace/West Terrace | Breakfast  |   |  |   |   | Breakfast: 7:00AM - 9:30AM<br>Lunch: 11:30AM - 12:30PM<br><br>Hudson River Cruise : 1:00PM - 4:00PM<br><br>Dinner: 6:00PM - 9:00PM | Study/Off<br><br>Breakfast: 7:00AM - 9:30AM<br>Lunch: 12:00PM - 1:30PM<br>Dinner: 6:00PM - 9:00PM |
| 9:00AM - 10:30AM   | Lecture I                                 | New York                   | Fault Tolerance - Logical Gates<br>Ben Brown, IBM Quantum<br>Daniel Litinski, PsiQuantum                   | Programming QEC Decoders<br>James Wootton, IBM Quantum  | Experimental QEC - Bosonic Codes<br>Alec Eickbusch & Volodymyr Sivak, Yale University                              | Experimental QEC - Bosonic Codes<br>Alec Eickbusch, Yale University<br>Volodymyr Sivak, Yale University | Fault Tolerance - Logical Gates<br>Ben Brown, IBM Quantum<br>Daniel Litinski, PsiQuantum                            |  |   |
| 10:30AM - 11:00AM  | Morning Tea Break                         | Atrium Lobby               | Morning Tea Break  |   |  |   |   |  |   |
| 11:00AM - 12:30PM  | Lecture II                                | New York                   | Experimental QEC - Bosonic Codes<br>Michel Devoret, Alec Eickbusch, & Volodymyr Sivak, Yale University     | Fault Tolerance - Logical Gates<br>Ben Brown, IBM Quantum<br>Daniel Litinski, PsiQuantum                | Fault Tolerance - Logical Gates<br>Ben Brown, IBM Quantum<br>Daniel Litinski, PsiQuantum                           | Programming QEC Decoders<br>James Wootton, IBM Quantum  | Experimental QEC - Bosonic Codes<br>Alec Eickbusch & Volodymyr Sivak, Yale University                               |  |   |
| 12:30PM - 1:25PM   | Lunch                                     | Winter Palace/West Terrace | Lunch  |   |  |   |   |  |   |
| 1:30PM - 2:00PM  | Q&A Sessions                              | Sunnyside                  | Q&A Session<br>Fault Tolerance - Logical Gates<br>Ben Brown, IBM Quantum<br>Daniel Litinski, PsiQuantum    | Q&A Session<br>Programming QEC Decoders<br>James Wootton, IBM Quantum                                   | Q&A Session<br>Experimental QEC - Bosonic Codes<br>Alec Eickbusch & Volodymyr Sivak, Yale University               | Q&A Session<br>Experimental QEC - Bosonic Codes<br>Alec Eickbusch & Volodymyr Sivak, Yale University    | Q&A Session<br>Fault Tolerance - Logical Gates<br>Ben Brown, IBM Quantum<br>Daniel Litinski, PsiQuantum             |  |   |
| 2:00PM - 2:30PM  |   | Lyndhurst                  | Q&A Session<br>Experimental QEC - Bosonic Codes<br>Michel Devoret, Alec Eickbusch, & Volodymyr Sivak, Yale | Q&A Session<br>Fault Tolerance - Logical Gates<br>Ben Brown, IBM Quantum<br>Daniel Litinski, PsiQuantum | Q&A Session<br>Fault Tolerance - Logical Gates<br>Ben Brown, IBM Quantum<br>Daniel Litinski, PsiQuantum            | Q&A Session<br>Programming QEC Decoders<br>James Wootton, IBM Quantum                                   | Q&A Session<br>Experimental QEC - Bosonic Codes<br>Alec Eickbusch & Volodymyr Sivak, Yale University                |  |   |
| 2:30PM - 4:30PM  | Unstructured Time                         | N/A                        | Unstructured Time  |   |  |   |   |  |   |
| 4:30PM - 5:00PM  | Open Problems, Student Talks, Crazy Ideas | New York                   | Student Talks  | Student Talks   | Open Problems - Part I<br>Experimental QEC - Bosonic Codes<br>Alec Eickbusch & Volodymyr Sivak, Yale University    | Crazy Ideas Session   | Open Problems - Part II<br>Fault Tolerance - Logical Gates<br>Ben Brown, IBM Quantum<br>Daniel Litinski, PsiQuantum |  |   |
| 5:00PM - 5:30PM  |   |                            |  |   | Open Problems - Part I<br>Fault Tolerance - Logical Gates<br>Ben Brown, IBM Quantum<br>Daniel Litinski, PsiQuantum |   | Open Problems - Part II<br>Experimental QEC - Bosonic Codes<br>Alec Eickbusch & Volodymyr Sivak, Yale University    |  |   |
| 5:30PM - 6:00PM  | Unstructured Time                         | N/A                        | Unstructured Time  |   |  |   |   |  |   |
| 6:00PM - 6:55PM  | Dinner                                    | Winter Palace/West Terrace | Dinner   |   |  |   |   |  |   |
| 7:00PM - 8:00PM  | Guest Lectures/Social Time                | New York                   | Guest Lecture<br>Chen Wang, UMass Amherst  | Unstructured Time   | Unstructured Time  | Unstructured Time   | Guest Lecture<br>Guanyu Zhu, IBM Quantum  |  |   |
| 8:00PM - 9:00PM  | Social                                    | Atrium Lobby               | Speaker Social   |   |  |   | Speaker Social  |  |   |

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| Week 3   |   |                            |  |  |   |  |  |   |   |
|--|---|----------------------------|--|--|---|--|--|---|---|
| QEC Decoding<br>Experimental QEC - Trapped Ions<br>Programming QEC Simulations |   |                            |  |  |   |  |  |   |   |
| Time   | Activity                                  | Location/Room              | Mon<br>18  | Tue<br>19  | Wed<br>20   | Thr<br>21  | Fri<br>22  | Sat<br>23   |   |
|  |   |                            |  |  |   |  |  | Sun<br>24   |   |
| 7:00AM - 8:55AM  | Breakfast                                 | Winter Palace/West Terrace | Breakfast  |  |   |  |  | Social Event TBA<br><br>Breakfast: 7:00AM - 9:30AM<br>Lunch & Dinner: TBA | Study/Off<br><br>Breakfast: 7:00AM - 9:30AM<br>Lunch: 12:00PM - 1:30PM<br>Dinner: 6:00PM - 9:00PM |
| 9:00AM - 10:30AM   | Lecture I                                 | New York                   | QEC Decoding<br>Christopher Chubb, ETH Zurich<br>Earl Campbell, AWS  | Programming QEC Simulations<br>Andrew Cross, IBM Quantum                           | Experimental QEC - Trapped Ions<br>Ken Brown, Duke University<br>Ciaran Ryan-Anderson, Quantinuum                           | Experimental QEC - Trapped Ions<br>Ken Brown, Duke University<br>Ciaran Ryan-Anderson, Quantinuum                | QEC Decoding<br>Christopher Chubb, ETH Zurich<br>Earl Campbell, AWS  |   |   |
| 10:30AM - 11:00AM  | Morning Tea Break                         | Atrium Lobby               | Morning Tea Break  |  |   |  |  |   |   |
| 11:00AM - 12:30PM  | Lecture II                                | New York                   | Experimental QEC - Trapped Ions<br>Ken Brown, Duke University<br>Ciaran Ryan-Anderson, Quantinuum                | QEC Decoding<br>Christopher Chubb, ETH Zurich<br>Earl Campbell, AWS                | QEC Decoding<br>Christopher Chubb, ETH Zurich<br>Earl Campbell, AWS   | Programming QEC Simulations<br>Andrew Cross, IBM Quantum   | Experimental QEC - Trapped Ions<br>Ken Brown, Duke University<br>Ciaran Ryan-Anderson, Quantinuum                            |   |   |
| 12:30PM - 1:25PM   | Lunch                                     | Winter Palace/West Terrace | Lunch  |  |   |  |  |   |   |
| 1:30PM - 2:00PM  | Q&A Sessions                              | Sunnyside                  | Q&A Session<br>QEC Decoding<br>Christopher Chubb, ETH Zurich<br>Earl Campbell, AWS                               | Q&A Session<br>Programming QEC Simulations<br>Andrew Cross, IBM Quantum            | Q&A Session<br>Experimental QEC - Trapped Ions<br>Ken Brown, Duke University<br>Ciaran Ryan-Anderson, Quantinuum            | Q&A Session<br>Experimental QEC - Trapped Ions<br>Ken Brown, Duke University<br>Ciaran Ryan-Anderson, Quantinuum | Q&A Session<br>QEC Decoding<br>Christopher Chubb, ETH Zurich<br>Earl Campbell, AWS   |   |   |
| 2:00PM - 2:30PM  |   | Lyndhurst                  | Q&A Session<br>Experimental QEC - Trapped Ions<br>Ken Brown, Duke University<br>Ciaran Ryan-Anderson, Quantinuum | Q&A Session<br>QEC Decoding<br>Christopher Chubb, ETH Zurich<br>Earl Campbell, AWS | Q&A Session<br>QEC Decoding<br>Christopher Chubb, ETH Zurich<br>Earl Campbell, AWS  | Q&A Session<br>Programming QEC Simulations<br>Andrew Cross, IBM Quantum  | Q&A Session<br>Experimental QEC - Trapped Ions<br>Ken Brown, Duke University<br>Ciaran Ryan-Anderson, Quantinuum             |   |   |
| 2:30PM - 4:30PM  | Unstructured Time                         | N/A                        | Unstructured Time  |  |   |  |  |   |   |
| 4:30PM - 5:00PM  | Open Problems, Student Talks, Crazy Ideas | New York                   | Student Talks  | Student Talks  | Open Problems - Part I<br>Experimental QEC - Trapped Ions<br>Ken Brown, Duke University<br>Ciaran Ryan-Anderson, Quantinuum | Crazy Ideas Session  | Open Problems - Part II<br>QEC Decoding<br>Christopher Chubb, ETH Zurich<br>Earl Campbell, AWS                               |   |   |
| 5:00PM - 5:30PM  |   |                            |  |  | Open Problems - Part I<br>QEC Decoding<br>Christopher Chubb, ETH Zurich<br>Earl Campbell, AWS                               |  | Open Problems - Part II<br>Experimental QEC - Trapped Ions<br>Ken Brown, Duke University<br>Ciaran Ryan-Anderson, Quantinuum |   |   |
| 5:30PM - 6:00PM  | Unstructured Time                         | N/A                        | Unstructured Time  |  |   |  |  |   |   |
| 6:00PM - 6:55PM  | Dinner                                    | Winter Palace/West Terrace | Dinner   |  |   | Social Event:<br>Diversity Panel @ Mary Duke Ballroom  | Dinner   |   |   |
| 7:00PM - 8:00PM  | Guest Lectures/Social Time                | New York                   | Guest Lecture<br>Aleksander Kubica, AWS  | Unstructured Time  | Guest Lecture<br>Michael Vasmer, Perimeter Institute  | Dinner @ Mary Duke Ballroom  | Guest Lecture<br>Leo DiCarlo, TU Delft   |   |   |
| 8:00PM - 9:00PM  | Social                                    | Atrium Lobby               | Speaker Social   |  | Speaker Social  | Unstructured Time  | Speaker Social   |   |   |

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| Week 4   |   |                            |  |   |   |   |  |   |   |  |
|--|---|----------------------------|--|---|---|---|--|---|---|--|
| LDPC Codes<br>Experimental QEC - Superconducting Qubits<br>Programming QEC Simulations |   |                            |  |   |   |   |  |   |   |  |
| Time   | Activity                                  | Location/Room              | Mon  | Tue   | Wed   | Thr   | Fri  | Sat   | Sun   |  |
|  |   |                            | 25   | 26  | 27  | 28  | 29   | 30  | 31  |  |
| 7:00AM - 8:55AM  | Breakfast                                 | Winter Palace/West Terrace | Breakfast  |   |   | Breakfast<br><b>Lecture begins at 8:30AM</b><br>Experimental QEC - Superconducting Qubits<br>Maika Takita, IBM Quantum<br>Antonio Córcoles, IBM Quantum<br>Andreas Wallraff, ETH Zurich | Breakfast  | Social Event TBA<br>Breakfast: 7:00AM - 9:30AM<br>Lunch & Dinner: TBA           | Students Depart<br>Breakfast: 7:00AM - 9:30AM |  |
| 9:00AM - 10:30AM   | Lecture I                                 | New York                   | LDPC Codes<br>Nikolas Breuckmann, UCL<br>Nicolas Delfosse, Microsoft   | Programming QEC Simulations<br>Andrew Cross, IBM Quantum                            | Experimental QEC - Superconducting Qubits<br>Maika Takita & Antonio Córcoles, IBM Quantum<br>Andreas Wallraff, ETH Zurich                           | LDPC Codes<br>Nikolas Breuckmann, UCL<br>Nicolas Delfosse, Microsoft  |  |   |   |  |
| 10:30AM - 11:00AM  | Morning Tea Break                         | Atrium Lobby               | Morning Tea Break  |   |   | <b>Lecture begins at 10:00AM</b><br>Programming QEC Simulations<br>Andrew Cross, IBM Quantum  | Morning Tea Break  |   |   |  |
| 11:00AM - 12:30PM  | Lecture II                                | New York                   | Experimental QEC - Superconducting Qubits<br>Maika Takita & Antonio Córcoles, IBM Quantum<br>Andreas Wallraff, ETH Zurich                | LDPC Codes<br>Nikolas Breuckmann, UCL<br>Nicolas Delfosse, Microsoft                | LDPC Codes<br>Nikolas Breuckmann, UCL<br>Nicolas Delfosse, Microsoft  | <b>Bus leaves at 11:45AM</b>  | Experimental QEC - Superconducting Qubits<br>Maika Takita & Antonio Córcoles, IBM Quantum<br>Andreas Wallraff, ETH Zurich                            |   |   |  |
| 12:30PM - 1:25PM   | Lunch                                     | Winter Palace/West Terrace | Lunch  |   |   | Social Event:<br>IBM Research BBQ & Lab Tour at IBM Yorktown  | Lunch  |   |   |  |
| 1:30PM - 2:00PM  | Q&A Sessions                              | Sunnyside                  | Q&A Session<br>LDPC Codes<br>Nikolas Breuckmann, UCL<br>Nicolas Delfosse, Microsoft  | Q&A Session<br>Programming QEC Simulations<br>Andrew Cross, IBM Quantum             | Q&A Session<br>Experimental QEC - Superconducting Qubits<br>Maika Takita & Antonio Córcoles, IBM Quantum<br>Andreas Wallraff, ETH Zurich            |   | Q&A Session<br>LDPC Codes<br>Nikolas Breuckmann, UCL<br>Nicolas Delfosse, Microsoft  |   |   |  |
| 2:00PM - 2:30PM  |   | Lyndhurst                  | Q&A Session<br>Experimental QEC - Superconducting Qubits<br>Maika Takita & Antonio Córcoles, IBM Quantum<br>Andreas Wallraff, ETH Zurich | Q&A Session<br>LDPC Codes<br>Nikolas Breuckmann, UCL<br>Nicolas Delfosse, Microsoft | Q&A Session<br>LDPC Codes<br>Nikolas Breuckmann, UCL<br>Nicolas Delfosse, Microsoft   |   | Q&A Session<br>Experimental QEC - Superconducting Qubits<br>Maika Takita & Antonio Córcoles, IBM Quantum<br>Andreas Wallraff, ETH Zurich             |   |   |  |
| 2:30PM - 4:30PM  | Unstructured Time                         | N/A                        | Unstructured Time  |   |   |   | Unstructured Time  |   |   |  |
| 4:30PM - 5:00PM  | Open Problems, Student Talks, Crazy Ideas | New York                   | Student Talks  | Student Talks   | Open Problems - Part I<br>Experimental QEC - Superconducting Qubits<br>Maika Takita & Antonio Córcoles, IBM Quantum<br>Andreas Wallraff, ETH Zurich |   | Open Problems - Part II<br>LDPC Codes<br>Nikolas Breuckmann, UCL<br>Nicolas Delfosse, Microsoft  |   |   |  |
| 5:00PM - 5:30PM  |   |                            |  |   | Open Problems - Part I<br>LDPC Codes<br>Nikolas Breuckmann, UCL<br>Nicolas Delfosse, Microsoft  |   | Open Problems - Part II<br>Experimental QEC - Superconducting Qubits<br>Maika Takita & Antonio Córcoles, IBM Quantum<br>Andreas Wallraff, ETH Zurich |   |   |  |
| 5:30PM - 6:00PM  | Unstructured Time                         | N/A                        | Unstructured Time  |   |   |   |  | Closing Dinner & Keynote Speaker<br>Sergey Bravyi, IBM Quantum @ Carriage House |   |  |
| 6:00PM - 6:55PM  | Dinner                                    | Winter Palace/West Terrace | Dinner   |   |   |   |  |   |   |  |
| 7:00PM - 8:00PM  | Guest Lectures/Social Time                | New York                   | Guest Lecture<br>Anirudh Krishna, Stanford University  | Unstructured Time   | Guest Lecture, Ted Yoder, IBM Quantum   | Unstructured Time   | Social Event TBA   |   |   |  |
| 8:00PM - 9:00PM  | Social                                    | Atrium Lobby               | Speaker Social   |   | Speaker Social  |   |  |   |   |  |