Graduate Workshop on Linear Algebra over Finite Fields & Applications

Aug 18 - 29, 2025

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Organizing Committee

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Abstract

Linear Algebra over finite fields is a building block for several applications including data storage, error detection and correction, and public-key cryptography. These applications enable the security and

possibility of our daily digital lives. This workshop aims to expose and engage junior researchers in the foundations and applications of linear algebra over finite fields.

Like linear algebra over infinite fields, linear algebra over finite fields considers vector spaces, matrices, and linear transformations, but there are some crucial differences that play a key role in applications. For instance, the intersection of a vector space and its dual may be nontrivial, and its dimension plays a role in entanglement assisted quantum error correcting codes, secret sharing, and protecting against fault injection and side channel attacks. Working over finite fields also facilitates error correction (classical and quantum) and local recovery of data, through linear systems of equations with only finitely many possible solutions. Linear algebra over finite fields plays a key role in code-based cryptography, the basis for families being considered in the final round of the NIST Post-Quantum Cryptography Standardization process. Quantum algorithms lead to vulnerabilities in current public-key cryptosystems which are prompting new studies of how matrices and linear algebra can support new cryptography.

This workshop will feature lectures on various applications of linear algebra over finite fields. Participants will learn about in the interplay between coding theory and cryptography along with mathematics related to a range of applications.

Participants will be assigned a group led by one of the course instructors. Open problems suitable for exploration by non-experts will be shared, and students will be guided in the research by these instructors.

Confirmed Speakers & Participants

Talks will be presented virtually or in-person as indicated in the schedule below.

Search

Type to Filter Participants

Sort

Last Name (default)

Speaker Virtual Speaker Poster Presenter
Attendee Virtual Attendee

Sarah Arpin
University of Colorado, Boulder

Alexander Barg
University of Maryland

Lubjana Beshaj
United States Military Academy West Point

Eimear Byrne
University College Dublin

Ryann Cartor
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Florida Atlantic University

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NIST

Joachim Rosenthal
University of Zurich

Madhu Sudan
Harvard University

Application Information

ICERM welcomes applications from faculty, postdocs, graduate students, industry scientists, and other researchers who wish to participate. Some funding may be available for travel and lodging. Graduate students who apply must have their advisor submit a statement of support in order to be considered.

Two semesters of graduate algebra is a prerequisite for applicants

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Your Visit to ICERM

ICERM Facilities

ICERM is located on the 10th & 11th floors of 121 South Main Street in Providence, Rhode Island. See our facilities page for more info about ICERM and Brown's available facilities.

Traveling to ICERM

ICERM is located at Brown University in Providence, Rhode Island. Providence's T.F. Green Airport (15 minutes south) and Boston's Logan Airport (1 hour north) are the closest airports. Providence is also on Amtrak's Northeast Corridor. In-depth directions and transportation information are available on our travel page.

Lodging

Confirmed participants will receive an email from ICERM to book a room at our preferred hotel the Hampton Inn & Suites Providence Downtown. Contact programstaff@icerm.brown.edu with any questions.

> *i* The only way ICERM participants should book a room is through the hotel reservation links located on this page or through links emailed to them from an ICERM email address (first_last@icerm.brown.edu). ICERM never works with any conference booking vendors and never collects credit card information.

Childcare/Schools

Those traveling with family who are interested in information about childcare and/or schools should contact housing@icerm.brown.edu.

Technology Resources

Wireless internet access ("Brown-Guest") and wireless printing is available for all ICERM visitors. Eduroam is available for members of participating institutions. Thin clients in all offices and common areas provide open access to a web browser, SSH terminal, and printing capability. See our Technology Resources page for setup instructions and to learn about all available technology.

Accessibility

To request special services, accommodations, or assistance for this event, please contact accessibility@icerm.brown.edu as far in advance of the event as possible. Thank you.

Discrimination and Harassment Policy	ICERM is committed to creating a safe, professional, and welcoming environment that benefits from the diversity and experiences of all its participants. Brown University's "Code of Conduct", "Discrimination and Workplace Harassment Policy", "Sexual and Gender-based Misconduct Policy", and "Title IX Policy" apply to all ICERM participants and staff. Participants with concerns or requests for assistance on a discrimination or harassment issue should contact the ICERM Director or Assistant Director Jenna Sousa; they are the responsible employees at ICERM under this policy.
Fundamental Research	ICERM research programs aim to promote Fundamental Research and mathematical sciences education. If you are engaged in sensitive or proprietary work, please be aware that ICERM programs often have participants from countries and entities subject to United States export control restrictions. Any discoveries of economically significant intellectual property supported by ICERM funding should be disclosed.
Exploring Providence	Providence's world-renowned culinary scene provides ample options for lunch and dinner. Neighborhoods near campus, including College Hill Historic District, have many local attractions. Check out the map on our Explore Providence page to see what's near ICERM.

Visa Information

Contact visa@icerm.brown.edu for assistance.

Eligible to be reimbursed	B-1 or Visa Waiver Business (WB)
Ineligible to be reimbursed	B-2 or Visa Waiver Tourist (WT)

Already in the US?	F-1 and J-1 not sponsored by ICERM: need to obtain a letter approving reimbursement from the International Office of your home institution PRIOR to travel. H-1B holders do not need letter of approval. All other visas: alert ICERM staff immediately about your situation. ICERM does not reimburse visa fees. This chart is to inform visitors whether the visa they enter the US on allows them to receive reimbursement for the items outlined in their invitation letter.

Financial Support

This section is for general purposes only and does not indicate that all attendees receive funding. Please refer to your personalized invitation to review your offer.

ORCID iD	As this program is funded by the National Science Foundation (NSF), ICERM is required to collect your ORCID iD if you are receiving funding to attend this program. Be sure to add your ORCID iD to your Cube profile as soon as possible to avoid delaying your reimbursement.
Acceptable Costs	• 1 roundtrip between your home institute and ICERM • Flights on U.S. or E.U. airlines – economy class to either Providence airport (PVD) or Boston airport (BOS) • Ground Transportation to and from airports and ICERM.
Unacceptable Costs	• Flights on non-U.S. or non-E.U. airlines • Flights on U.K. airlines

	• Seats in economy plus, business class, or first class • Change ticket fees of any kind • Multi-use bus passes • Meals or incidentals
Advance Approval Required	• Personal car travel to ICERM from outside New England • Multiple-destination plane ticket; does not include layovers to reach ICERM • Arriving or departing from ICERM more than a day before or day after the program • Multiple trips to ICERM • Rental car to/from ICERM • Flights on a Swiss, Japanese, or Australian airlines • Arriving or departing from airport other than PVD/BOS or home institution's local airport • 2 one-way plane tickets to create a roundtrip (often purchased from Expedia, Orbitz, etc.)
Travel Maximum Contributions	• New England: $350 • Other contiguous US: $850 • Asia & Oceania: $2,000 • All other locations: $1,500 • Note these rates were updated in Spring 2023 and superseded any prior invitation rates. Any invitations without travel support will still not receive travel support.
Reimbursement Requests	Request Reimbursement with Cube Refer to the back of your ID badge for more information. Checklists are available at the front desk and in the Reimbursement section of Cube.
Reimbursement Tips	• Scanned original receipts are required for all expenses • Airfare receipt must show full itinerary and payment • ICERM does not offer per diem or meal reimbursement

- Allowable mileage is reimbursed at prevailing IRS Business Rate and trip documented via pdf of Google Maps result
- Keep all documentation until you receive your reimbursement!

Reimbursement Timing	6 - 8 weeks after all documentation is sent to ICERM. All reimbursement requests are reviewed by numerous central offices at Brown who may request additional documentation.
Reimbursement Deadline	Submissions must be received within 30 days of ICERM departure to avoid applicable taxes. Submissions after thirty days will incur applicable taxes. No submissions are accepted more than six months after the program end.

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