

# MICHAEL NEUDER

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🌐 Brooklyn, NY

## EDUCATION

<b>Harvard University</b> <i>Master of Science, Computational Science and Engineering</i>	2020 - 2021 Cambridge, MA
<b>University of Colorado</b> <i>Bachelor of Arts, Computer Science &amp; Bachelor of Arts, Mathematics</i>	2015 - 2020 Boulder, CO
<b>University of Oxford</b> <i>Visiting Student, Mansfield College</i>	Spring 2018 Oxford, UK

## ACADEMIC EXPERIENCE

<b>EconCS Group, Harvard University</b> <i>Research Assistant supervised by Prof. David C. Parkes</i>	August 2019 - August 2021 Cambridge, MA
<b>Santa Fe Institute</b> <i>Undergraduate Research Fellow: Summer 2018 REU</i>	June 2018 - August 2018 Santa Fe, NM
<b>Bradley Lab, University of Colorado</b> <i>Research Assistant supervised by Prof. Elizabeth Bradley</i>	April 2017 - August 2021 Boulder, CO
<b>Mozer Lab, University of Colorado</b> <i>Research Assistant supervised by Prof. Michael Mozer</i>	March 2017 - May 2019 Boulder, CO

## INDUSTRY EXPERIENCE

<b>The Ethereum Foundation</b> <i>Researcher – Applied Research Group (ARG)</i>	March 2023 - Present New York, NY
<b>Google</b> <i>Software Engineer (L3 → L4) – Cloud Storage</i>	August 2021 - Feb 2023 (Cambridge, MA)
<i>Software Engineering Intern – Network Infrastructure</i>	Summer 2020 (remote)
<i>Software Engineering Intern – Flights</i>	Summer 2019 (Cambridge, MA)
<i>Software Engineering Intern – Mobile Device Management</i>	Fall 2018 (Sunnyvale, CA)
<b>Lockheed Martin &amp; LASP<sup>1</sup></b> <i>Software Engineering Intern</i>	Feb 2017 - Oct 2017 Boulder, CO

## PUBLICATIONS & CORRESPONDING TALKS (REVERSE CHRONOLOGICAL)

- (1) **M. Neuder**, M. Pai, and M. Resnick, “Optimizing Exit Queues for Proof-of-Stake Blockchains: A Mechanism Design Approach,” (2024) *ACM Conference on Advances in Financial Technologies (AFT)*.  
<https://arxiv.org/abs/2406.05124>.  
– [Conference talk](#). September 24, 2024.
- (2) Z. Fan, F. Marmolejo-Cossio, D. J. Moroz, **M. Neuder**, R. Rao, and D. C. Parkes, “Strategic Liquidity Provision in Uniswap v3,” (2023) *ACM Conference on Advances in Financial Technologies (AFT)*.  
<https://doi.org/10.4230/LIPICs.AFT.2023.25>.
- (3) **M. Neuder**, E. Bradley, E. Dlugokencky, J. W. C. White, J. Garland, “Detection of Local Mixing in Time Series using Permutation Entropy,” (2021) *Physical Review E* 103. <https://doi.org/10.1103/PhysRevE.103.022217>.  
– [Poster Presentation](#). 2021 European Geosciences Union General Assembly. April 13, 2021.

<sup>1</sup>Laboratory of Atmospheric and Space Physics: <https://lasp.colorado.edu/home/>.

- (4) **M. Neuder**, D. J. Moroz, R. Rao, D. C. Parkes, “Low-cost attacks on Ethereum 2.0 by sub-1/3 stakeholders,” (2020) *Workshop on Game Theory in Blockchain, Conference on Web and Internet Economics (WINE)*. <https://arxiv.org/pdf/2102.02247>.  
– [Conference talk](#). December 8, 2020.
- (5) **M. Neuder**, D. J. Moroz, R. Rao, D. C. Parkes, “Defending Against Malicious Reorgs in Tezos Proof-of-Stake,” (2020) *ACM Conference on Advances in Financial Technologies (AFT)*. <https://doi.org/10.1145/3419614.3423265>.  
– [Conference talk](#). October 21, 2020.
- (6) **M. Neuder**, D. J. Moroz, R. Rao, D. C. Parkes, “Selfish Behavior in the Tezos Proof-of-Stake Protocol,” (2020) *Cryptoeconomic Systems (CES) Conference*. <https://arxiv.org/pdf/1912.02954.pdf>.  
– [Conference talk](#). March 7, 2020.
- (7) J. Garland, T. Jones, **M. Neuder**, J. W. C. White, E. Bradley, “An information-theoretic approach to extracting climate signals from deep polar ice cores,” (2019) *Chaos: An Interdisciplinary Journal of Nonlinear Science* 29:101105. <https://doi.org/10.1063/1.5127211>.
- (8) J. Garland, T. Jones, **M. Neuder**, V. Morris, J. W. C. White, E. Bradley, “Anomaly Detection in Paleoclimate Records using Information Theory,” (2018) *Entropy* 20(12):931. <https://doi.org/10.3390/e20120931>.

## AWARDS

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- 2020** Computer Science Discovery Learning Award (University of Colorado).  
**2019** Sieglinde Talbott Haller Scholarship in Mathematics (University of Colorado).  
**2019** Honorable Mention: Computing Research Assoc. Outstanding Undergraduate Researcher. [link](#).  
**2017** Phi Beta Kappa (University of Colorado). [link](#).  
**2015-2020** President Joseph A. Sewall Esteemed Scholar Award (University of Colorado). [link](#).  
**2015-2020** Dean’s List (University of Colorado). [link](#).

## PROFESSIONAL SERVICE

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- 2023 & 2024** Columbia CryptoEconomics Workshop (CCE). *Organizing Committee*. [link](#).  
**2024** The Latest in DeFi Research (TLDR) Conference. *Program Committee*. [link](#).  
**2024** Crypto Academic Summer School at Edge City. *Organizing Committee*. [link](#).  
**2023** dYdX MEV Committee. *Member*. [link](#).

## BLOCKCHAIN ARTICLES (NON-PEER REVIEWED) (BY TOPIC)

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### **Proof-of-Stake**

#### ETH, the asset

- My (e)thesis: settlement, data availability, execution – in that order. [link](#). [tweet](#).
- Issuance Issues – Tertiary Treatise. [link](#). [tweet](#).
- Issuance Issues – Subsequent Soliloquy. [link](#). [tweet](#).
- Issuance Issues – Initial Issue. [link](#). [tweet](#).

#### Ethereum Consensus

- Concurrent Block Proposers in Ethereum, *with Max Resnick*. [link](#). [tweet](#).
- Rollup-Centric Roadmap (2024 version), *with Alex Stokes*. [link](#). [tweet](#).
- A set-theoretic view of Ethereum coteries. [link](#). [tweet](#).
- Time, slots, and the ordering of events in Ethereum, *with Georgios Konstantopoulos*. [link](#). [tweet](#).

#### EIP-7251 ([link](#)) – Increase the MAX\_EFFECTIVE\_BALANCE

- A modest proposal, *with Francesco D’Amato, Aditya Asgaonkar, Justin Drake*. [link](#). [tweet](#).
- Slashing penalty analysis; EIP-7251, *with Barnabe Monot*. [link](#). [tweet](#).
- Validator consolidation in EIP-7251, *with Francesco D’Amato, Mikhail Kalinin*. [link](#). [tweet](#).
- FAQ on EIP-7251, *with Francesco D’Amato, Mikhail Kalinin, dAppLion*. [link](#). [tweet](#).

#### EIP-7547 ([link](#)) – Inclusion Lists

- No free lunch – a new inclusion list design, *with Vitalik Buterin*. [link](#). [tweet](#).

- Unconditional inclusion lists, *with Toni Wahrstatter*. [link](#). [tweet](#).
- Resistance is not futile; CR in mev-boost. [link](#). [tweet](#).
- Inclusion lists: execution, consensus, & engine spec overview. [link](#). [tweet](#).
- Inclusion Lists PoC Specification. [link](#). [tweet](#).
- The Case for ILECTRA. [link](#). [tweet](#).

#### Liquid staking & restaking

- The Risks of LRTs, *with Tarun Chitra*. [link](#). [tweet](#).
- Musings on “two-tiered” staking, a native Liquid Staking Token design. [link](#). [tweet](#).
- Magnitude and direction of Lido attack vectors. [link](#). [tweet](#).

### **Maximal Extractable Value (MEV)**

#### Enshrined Proposer-Builder Separation (ePBS)

- Why enshrine Proposer-Builder Separation, *with Justin Drake*. [link](#). [tweet](#).
- Payload-timeliness committee (PTC), *with Francesco D’Amato*. [link](#). [tweet](#).
- Equivocation attacks in mev-boost and ePBS, *with Francesco D’Amato*. [link](#). [tweet](#).
- Relays in a post-ePBS world, *with Jon, Hasu, Tomasz, Chris, Toni*. [link](#). [tweet](#).
- ePBS – the infinite buffet. [link](#). [tweet](#).
- Consider the ePBS. [link](#). [tweet](#).

#### Relays

- Optimistic Relay Proposal, *with Justin Drake*. [link](#).
- An optimistic weekend. [link](#). [tweet](#).
- Towards enshrined PBS – an optimistic roadmap. [link](#).
- Optimistic relays and where to find them, *with Ankit Chiplunkar*. [link](#). [tweet](#).
- Bid cancellations considered harmful, *with Thomas Thiery*. [link](#). [tweet](#).

#### Miscellanea

- Mechan-stein (alt. Franken-ism). [link](#). [tweet](#).
- On block-space distribution mechanisms, *with Pranav Garimidi, Tim Roughgarden*. [link](#). [tweet](#).
- Execution Tickets, *with Justin Drake*. [link](#). [tweet](#).
- How I learned to stop worrying and love mev-burn, *with Justin Drake, Toni Wahrstatter*. [link](#). [tweet](#).
- Timing Games: Implications and Possible Mitigations, *with Caspar Schwarz-Schilling*. [link](#). [tweet](#).

## **BLOCKCHAIN PRESENTATIONS, PODCASTS, & PANELS**

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### **Presentations**

- Neutrality in Ethereum – *Harvard Club of New York City. October 2024*. [slides](#).
- Separating MEV and Staking Rewards – *CBER Webinar. September 2024*. [recording](#). [slides](#).
- More slides about Ethereum Blockspace – *Scroll Protocol Symposium. August 2024*. [recording](#). [slides](#).
- More slides about PBS – *MEV Workshop, Stanford Blockchain Conference. August 2024*. [recording](#). [slides](#).
- Postmodern Staking – *9<sup>th</sup> Annual IC3 Blockchain Camp. June 2024*. [slides](#).
- Is restaking the new staking? – *CBER Forum Annual Conference. May 2024*. [recording](#). [slides](#).
- State of the Ethereum Union (1/N perspective) – *ETHBoston. April 2024*. [slides](#).
- No Free Lunch – *Columbia CryptoEconomics Working Session. December 2023*. [recording](#). [slides](#).
- Enshrining PBS – *Center for Digital Finance & Technologies. December 2023*. [slides](#).
- Why it’s hard to enshrine PBS – *Archetype MEV Lunch. November 2023*. [recording](#). [slides](#).
- Reorgs in PoS – *MEV Roast; Reorg Edition. August 2021*. [recording](#). [slides](#).

#### DEVCON 7 (November 2024)

- ETH is permissionless money – *DEVCON Main stage*. [recording](#). [slides](#).
- The ticker is ETH – *Bankless Summit*. [recording](#). [slides](#).

#### ETHDenver (March 2024)

- Execution Tickets – *Beyond the Block (Titan Builder & Hashkey Capital)*. [recording](#). [slides](#).
- The Risks of LRTs – *Research Day (SevenX Ventures)*. [recording](#). [slides](#).

#### DevConnect (November 2023)

- Increase the MAX\_EFFECTIVE\_BALANCE – *EthStaker Staking Gathering*. [recording](#). [slides](#).

- A set theoretic view of Ethereum coteries – *LidoConnect*.

[recording.](#) [slides.](#)

#### EthCC (Community Conference) (July 2023)

- Towards Enshrined Proposer-Builder Separation – *EthCC main event*.
- Ethereum PBS R&D Roadmap – *Modular Summit*.
- Increase the MAX\_EFFECTIVE\_BALANCE – *Kiln Rendez-vous*.

[recording.](#) [slides.](#)

[recording.](#) [slides.](#)

[recording.](#) [slides.](#)

#### **Podcasts**

- Ethernets North Star – *The Gwart Show*. October 2024.
- The Future of Ethereum: Is This The Right Track? – *Bankless*. October 2024.
- The Ethereum Roadmap is NOT Off Track! – *Bankless*. September 2024.
- ETH Insights: Discussing MaxEB – *Coinbase Webinar*. April 2024.
- PeepAnEIP: EIP-7547 – *Ethereum Cat Herders*. April 2024.
- Endgame 2.0: A Guide to Vitalik's Ethereum Roadmap – *Bankless*. February 2024.
- We're Pretty Sure Mike and Max Can Fix MEV – *The Gwart Show*. February 2024.
- PeepAnEIP: EIP-7251 – *Ethereum Cat Herders*. February 2024.
- Eigenlayer In 2024 (co-host) – *Bankless*. December 2023.
- An Incomplete Guide to PBS – *Uncommon Core 2*. September 2023.

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#### **Panels**

- Restaking Panel – *Staking Rewards Staking Summit*. November 2024.
- Decentralization Panel – *Espresso Beyond the Baselaye*. March 2024.
- Decentralize or Bust – *bloXroute & ETHStaker*. March 2024.
- Alignment Panel – *EigenLayer Restaking Summit*. November 2023.
- PBS & Beyond – *MEVDay Paris*. July 2023.

[recording.](#)

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## **OPEN SOURCE CONTRIBUTIONS**

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#### EIP-7547: Inclusion Lists (python) (repo)

- EIP (Ethereum Improvement Proposal).
- Spec Overview (Consensus, Execution, and Engine API specifications).
- Proof-of-Concept Specification.
- Compilation of Related Work.

[link.](#)

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#### EIP-7251: Increase the MAX\_EFFECTIVE\_BALANCE (python) (repo)

- EIP (Ethereum Improvement Proposal).
- Minimal Spec Change (Consensus specifications).
- Compilation of Related Work.

[link.](#)

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#### MEV-boost Relay: Optimistic Processing (golang) (repo)

- Main pull request & design documentation.
- Header-only parsing optimization.
- Pull request list.
- Proposal.
- Builder Onboarding.

[link.](#)

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#### Erigon (Ethereum Execution Layer Client) (golang) (repo)

- Refactored req/resp domain network encoding.
- Consensus spec implementation.
- Pull request list.

[link.](#)

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#### Prysm (Ethereum Consensus Layer Client) (golang) (repo)

- Keymanager code-health refactor.
- Pull request list.

[link.](#)

[link.](#)

#### STRUMPACK (High-performance matrix math package) (C++) (repo)

- Mixed-precision (float64 & float32) iterative refinement.
- Pull request list.
- Write-up.

[link.](#)

[link.](#)

[link.](#)

OptRBC (Optimal solutions in 2D Rayleigh-Benard Convection) (FORTAN) ([repo](#))

- Multiprocessor implementation using [openmp](#).
- Write-up.

[link](#).  
[link](#).

Image quality convolutional neural networks. (python) ([repo](#))

- Write-up.
- Example network.

[link](#).  
[link](#).

## MISCELLANEA: FUN WRITING & SOFTWARE

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### Writing

- Tattoo probabilistic analysis.
- Solo-staking rig.
- NBA draft probabilistic analysis.
- Shakespeare Zipf-ian analysis.

[link](#). [tweet](#).  
[link](#). [tweet](#).  
[link](#).  
[link](#).

### Software

- Monte Carlo numerical demonstrations. (python)
- Connect Four PyQT application. (python)
- Terminal implementation of games. (perl)
- Rubik's cube solver. (C++)

[link](#).  
[link](#).  
[link](#).  
[link](#).