# MICHAEL (mike) NEUDER

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🌐 Colorado, USA

## EDUCATION

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|---|---|
| **Harvard University** | 2020 - 2021 |
| *Master of Science, Computational Science* | *Cambridge, Massachusetts* |
| **University of Colorado** | 2015 - 2020 |
| *Bachelor of Arts, Computer Science* | *Boulder, Colorado* |
| *Bachelor of Arts, Mathematics* | |

## ACADEMIC EXPERIENCE

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

## INDUSTRY EXPERIENCE

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|---|---|
| **The Ethereum Foundation** | March 2023 - Present |
| *Researcher – Applied Research Group (ARG)* | *New York, NY* |
| **Google** | |
| *Software Engineer (L3 → L4) – Cloud Storage* | August 2021 - Feb 2023 (*Cambridge, MA*) |
| *Software Engineering Intern    – Network Infrastucture* | Summer 2020 (*remote*) |
| *Software Engineering Intern    – Flights* | Summer 2019 (*Cambridge, MA*) |
| *Software Engineering Intern    – Mobile Device Management* | Fall 2018 (*Sunnyvale, CA*) |
| **Lockheed Martin & LASP**[1] | Feb 2017 - Oct 2017 |
| *Software Engineering Intern* | *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) *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) *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.

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[1]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

**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

**2025** Crypto & Blockchain Economics Research Forum (CBER) Conference. *Program Committee.* link.
**2023, 2024** Columbia CryptoEconomics Workshop (CCE). *Organizing Committee.* link.
**2024, 2025** 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)

**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

### Presentations

○ Validator incentives – *Oxford-Harvard Conference on DeFi. January 2025.*　　slides.
○ 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 – *9th 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.* recording. slides.
- Ethereum PBS R&D Roadmap – *Modular Summit.* recording. slides.
- Increase the MAX_EFFECTIVE_BALANCE – *Kiln Rendez-vous.* recording. slides.

### Podcasts

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

### Panels

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

## OPEN SOURCE CONTRIBUTIONS

EIP-7547: Inclusion Lists (`python`) (repo)
- EIP (Ethereum Improvement Proposal). link.
- Spec Overview (Consensus, Execution, and Engine API specifications). link.
- Proof-of-Concept Specification. link.
- Compilation of Related Work. link.

EIP-7251: Increase the MAX_EFFECTIVE_BALANCE (`python`) (repo)
- EIP (Ethereum Improvement Proposal). link.
- Minimal Spec Change (Consensus specifications). link.
- Compilation of Related Work. link.

MEV-boost Relay: Optimistic Processing (`golang`) (repo)
- Main pull request & design documentation. link.
- Header-only parsing optimization. link.
- Pull request list. link.
- Proposal. link.
- Builder Onboarding. link.

Erigon (Ethereum Execution Layer Client) (`golang`) (repo)
- Refactored req/resp domain network encoding. link.
- Consensus spec implementation. link.
- Pull request list. link.

Prysm (Ethereum Consensus Layer Client) (`golang`) (repo)
- Keymanager code-health refactor. link.
- Pull request list. link.

STRUMPACK (High-performance matrix math package) (`C++`) (repo)
- Mixed-precision (`float64` & `float32`) iterative refinement. link.

- ○ Pull request list. link.
- ○ Write-up. link.

OptRBC (Optimal solutions in 2D Rayleigh-Benard Convection) (`FORTAN`) (repo)
- ○ Multiprocessor implementation using openmp. link.
- ○ Write-up. link.

Image quality convolutional neural networks. (`python`) (repo)
- ○ Write-up. link.
- ○ Example network. link.

## MISCELLANEA: FUN WRITING & SOFTWARE

Writing
- ○ Tattoo probabilistic analysis. link. tweet.
- ○ Solo-staking rig. link. tweet.
- ○ NBA draft probabilistic analysis. link.
- ○ Shakespeare Zipf-ian analysis. link.

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