MICHAEL (mike) NEUDER

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Colorado, USA

EDUCATION

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

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

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.

(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.

[1] Laboratory of Atmospheric and Space Physics: https://lasp.colorado.edu/home/.

– 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

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 – 9^{th} *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.