MICHAEL (mike) NEUDER

✉ michael.neuder@gmail.com
🖥 michaelneuder.github.io
🌍 brooklyn, ny

EDUCATION

Harvard University	2020 - 2021
Master of Science, Computational Science and Engineering	*Cambridge, MA*
University of Colorado	2015 - 2020
Bachelor of Arts, Computer Science & Bachelor of Arts, Mathematics	*Boulder, CO*
University of Oxford	Spring 2018
Visiting Student, Mansfield College	*Oxford, UK*

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) *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.*

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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

2023 & 2024 Columbia CryptoEconomics Workshop (CCE).   *Organizing Committee.* link.
2024 The Latest in DeFi Research (TLDR) Confrerence.   *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

- 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.

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

○ Ethereums 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

○ 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.