MICHAEL (mike) NEUDER

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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 2018
Visiting Student, Mansfield College *Oxford, UK*

ACADEMIC EXPERIENCE

EconCS Group, Harvard University August 2019 - August 2021
Research Assistant supervised by Dr. 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 Dr. Elizabeth Bradley *Boulder, CO*

Mozer Lab, University of Colorado March 2017 - May 2019
Research Assistant supervised by Dr. 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 2020 - March 2021 (*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) Zhou Fan, Francisco Marmolejo-Cossio, Daniel Moroz, **Michael Neuder**, Rithvik Rao, and David C. Parkes, "Strategic Liquidity Provision in Uniswap v3," *ACM Conference on Advances in Financial Technologies (AFT) 2023*. https://doi.org/10.4230/LIPIcs.AFT.2023.25.

(2) **M. Neuder**, E. Bradley, E. Dlugokencky, J. W. C. White, J. Garland, "Detection of Local Mixing in Time Series using Permutation Entropy," *Physical Review E 103*, 2021. https://doi.org/10.1103/PhysRevE.103.022217.

– Poster Presentation. 2021 European Geosciences Union General Assembly. *April 13, 2021.*

(3) **M. Neuder**, D. J. Moroz, R. Rao, D. C. Parkes, "Low-cost attacks on Ethereum 2.0 by sub-1/3 stakeholders," *Workshop on Game Theory in Blockchain, Conference on Web and Internet Economics (WINE) 2020*. https://econcs.pku.edu.cn/wine2020/wine2020/Workshop/GTiB20_paper_8.pdf.

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

– Conference talk. *December 8, 2020.*

(4) **M. Neuder**, D. J. Moroz, R. Rao, D. C. Parkes, "Defending Against Malicious Reorgs in Tezos Proof-of-Stake," *ACM Conference on Advances in Financial Technologies (AFT) 2020.* https://doi.org/10.1145/3419614.3423265.

– Conference talk. *October 21, 2020.*

(5) **M. Neuder**, D. J. Moroz, R. Rao, D. C. Parkes, "Selfish Behavior in the Tezos Proof-of-Stake Protocol," *Cryptoeconomic Systems (CES) Conference 2020.* https://arxiv.org/pdf/1912.02954.pdf.

– Conference talk. *March 7, 2020.*

(6) 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," *Chaos: An Interdisciplinary Journal of Nonlinear Science* 29:101105 (2019). https://doi.org/10.1063/1.5127211.

(7) J. Garland, T. Jones, **M. Neuder**, V. Morris, J. W. C. White, E. Bradley, "Anomaly Detection in Paleoclimate Records using Information Theory," *Entropy* 20(12):931 (2018). 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 link. *Honorable Mention: Computing Research Association Outstanding Undergraduate Researcher.*
2017 link. *Phi Beta Kappa (University of Colorado).*
2015-2020 link. *President Joseph A. Sewall Esteemed Scholar Award (University of Colorado).*
2015-2020 link. *Dean's List. (University of Colorado).*

PROFESSIONAL SERVICE

2023 & 2024 link. *Columbia CryptoEconomics Workshop (CCE).* *Organizing Committee.*
2024 link. *Workshop on Blockchains and Decentralized Finance (EC).* *Program Committee.*
2024 link. *The Latest in DeFi Research (TLDR) Confrerence.* *Program Committee.*
2024 link. *Crypto Academic Summer School at Edge City.* *Organizing Committee.*
2023 link. *dYdX MEV Committee.* *Member.*

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

Proof-of-Stake

Ethereum Consensus

- link. *Issuance Issues – Subsequent Soliloquy.*
- link. *Issuance Issues – Initial Issue.*
- link. *Concurrent Block Proposers in Ethereum.*
- link. *Rollup-Centric Roadmap (2024 version) (mike+stokes version) (From The Vault)*
- link. *A set-theoretic view of Ethereum coteries.*
- link. *Time, slots, and the ordering of events in Ethereum Proof-of-Stake*

EIP-7251 (link) – Increase the `MAX_EFFECTIVE_BALANCE`

- link. *Increase the MAX_EFFECTIVE_BALANCE – a modest proposal.*
- link. *Slashing penalty analysis; EIP-7251.*
- link. *Validator consolidation in EIP-7251.*
- link. *FAQ on EIP-7251; Increasing the MAX_EFFECTIVE_BALANCE.*

EIP-7547 (link) – Inclusion Lists

- link. *No free lunch – a new inclusion list design.*
- link. *Unconditional inclusion lists.*
- link. *Resistance is not futile; CR in mev-boost.*
- link. *Inclusion lists: execution, consensus, & engine spec overview.*
- link. *Inclusion Lists PoC Specification.*
- link. *The Case for ILECTRA.*

Liquid staking & restaking

- link. *The Risks of LRTs.*
- link. *Musings on "two-tiered" staking, a native Liquid Staking Token design.*
- link. *Magnitude and direction of Lido attack vectors.*

Maximal Extractable Value (MEV)

Relays

- link. *Optimistic Relay Proposal.*
- link. *An optimistic weekend.*
- link. *Towards enshrined PBS – an optimistic roadmap.*
- link. *Optimistic relays and where to find them.*
- link. *Bid cancellations considered harmful.*

Enshrined Proposer-Builder Separation (ePBS)

- link. *Why enshrine Proposer-Builder Separation? A viable path to ePBS.*
- link. *Payload-timeliness committee (PTC) – an ePBS design.*
- link. *Equivocation attacks in mev-boost and ePBS.*
- link. *Relays in a post-ePBS world.*
- link. *ePBS – the infinite buffet.*
- link. *Consider the ePBS.*

Miscellanea

- link. *Execution Tickets.*
- link. *Dr. Changestuff or: how i learned to stop worrying and love mev-burn.*
- link. *Timing Games: Implications and Possible Mitigations.*

BLOCKCHAIN PRESENTATIONS, PANELS, & PODCASTS

Presentations

- *Is restaking the new staking?* – CBER Forum Annual Conference. May 2024. 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.

Panels

- *Decentralization Panel* – Espresson 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.

Podcasts

- *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.

OPEN SOURCE CONTRIBUTIONS

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

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

MEV-boost Relay: Optimistic Processing (`golang`)
- *Main pull requests & design documentation:* 1st, 2nd, 3rd *(final & merged).*
- link. *Header-only parsing optimization.*
- link. *Pull request list.*
- link. *Proposal.*
- link. *Builder Onboarding.*

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

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

STRUMPACK (High-performance matrix math package) (`C++`)
- link. *Mixed-precision (`float64` & `float32`) iterative refinement.*
- link. *Pull request list.*
- link. *Write-up.*

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

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

MISCELLANEA: FUN WRITING & SOFTWARE

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

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