

# Hoang Anh (Benjamin) NGUYEN

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## RESEARCH INTERESTS

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### Geophysics, Computational Math, and Quantum Computing:

- Full waveform inversion (FWI)
- Partial differential equation and optimization
- Deep learning and physics-informed neural network (PINNs)
- Atomistic simulations
- Large-scale behavior of the Earth

## EDUCATION

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<b>Ph.D. of Geophysics</b>   <i>Major: Geophysics - Minor: Computer Science</i> Colorado School of Mines (CSM)	Aug 2023 – Present Golden, CO, USA
<b>Post-grad Diploma of Earth Sciences</b>   <i>Major: Earth System Physics</i> International Centre for Theoretical Physics (ICTP) - UNESCO Thesis: Ambient noise Tomography beneath the Banda Arc	Sept 2022 – Aug 2023 Trieste, Italy
<b>Master of Engineering Physics</b>   <i>Major: Computational Physics</i> Hanoi University of Science and Technology (HUST) Thesis: Structural Simulation of MgSiO <sub>3</sub> under Compression	May 2021 – Sept 2023 Hanoi, Vietnam
<b>Engineer of Engineering Physics</b>   <i>Major: Computational Physics</i> Talent Honours Program – HUST Thesis: Computational Modelling of Microstructure of Magnesium Silicate	Sept 2016 – April 2021 Hanoi, Vietnam

## RESEARCH EXPERIENCE

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<b>Research Assistant</b> Department of Geophysics - CSM	Aug 2023 – Present Advised by Prof. A. Tura
<ul style="list-style-type: none"><li>• Elastic FWI - Devito</li><li>• Seismic inversion with quantum computing and PINNs</li><li>• Parallel computing - Language: Python/Julia</li></ul>	
<b>RCP Seismic Immersive Lab Support</b> Reservoir Characterization Project (RCP) - CSM	Aug 2024 – Present Advised by L. Irons
<ul style="list-style-type: none"><li>• Admin privilege: managing data, licenses, OS systems and software</li></ul>	
<b>Research Assistant</b> Earth System Physics - ICTP	May 2023 – Aug 2023 Advised by Prof. A. Aoudia & Dr. D. Manu-Marfo
<ul style="list-style-type: none"><li>• Ambient noise tomography</li><li>• Nonlinear inversion</li><li>• Parallel computing - Language: Python/Fortran</li></ul>	
<b>Research Assistant</b> Department of Computational Physics - HUST	Aug 2018 – July 2023 Advised by Asst. Prof. V. H. Nguyen
<ul style="list-style-type: none"><li>• Molecular dynamics simulation</li><li>• Parallel computing - Language: C/Matlab</li></ul>	

## WORK EXPERIENCE

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### Geophysics R&D Intern

TGS

May 2025 – Aug 2025

Houston, TX

- Dynamic Matching FWI - Devito Pro - Language: Python

### Geophysics R&D Intern

Vietnam Petroleum Institute

Aug 2021 – Feb 2022

Hanoi, Vietnam

- 2D and 3D ray-tracing with Madagascar
- Seismic travel time inversion - Language: C/Matlab

## ACADEMIC ACTIVITIES

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### RCP Sponsor Meeting

Seismic Inversion with Quantum Computing ([Report - No confidential data](#))

April 2024

Golden, CO

### Erasmus Master Exchange Program

Physics of Complex Systems - Polytechnic University of Turin (POLITO)

Feb 2022 – July 2022

Torino, Italy

### Student Scientific Research Conference of HUST

Presentation: Study on Structure of Magnesium Silicate Material under Densification

May 2020

Hanoi, Vietnam

### Vietnam Robot National Contest

Team member of HUST

May 2019

Hanoi, Vietnam

## HONORS AND AWARDS

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### Fully funded scholarship for postgraduate program at ICTP 2023

### VEF 2.0 Program recommended candidate 2023

The [VEF 2.0 Program](#) is conducted by the Fellows and Scholars of the Vietnam Education Foundation (VEF) – an independent U.S. Federal Government agency created by the U.S. Congress

### Erasmus+ scholarship for the master exchange program at POLITO 2022

### Fully funded scholarship for the master program at HUST 2021, 2022

### Certificate of Merit from School of Engineering Physics for undergraduate students

Excellent Student in Fall Semester 2017, Spring Semester 2018, Fall Semester 2018, Spring Semester 2019

### Vietnam National Student Physics Olympiad XX 2018 - Second Prize

### Lawrence S.Ting Scholarship 2017 for undergraduate students

## CURRENT WORK & PUBLICATIONS [P: PHYSICS, G: GEOPHYSICS]

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- [1] **H. A. Nguyen**, H. S. Nguyen and V. D. Lai. Tailoring hydrogen storage performance of Mg–Mg<sub>2</sub>Ni alloys: synergistic effects of composition and phase formation with first-principles insights. *Int. J. Hydrogen Energy*, 2025. In writing.
- [2] N.V. Yen, H.D Phan, E. L. C. VI M. Plan, **H. A. Nguyen**, N.V. Hong and P.H. Kien, Study of the density-phase and Micro-phase separation in the model GeO<sub>2</sub> liquid under compression. 2025. In writing.
- [3] **H. A. Nguyen**, M. Daniel, A. Abdelkrim. Ambient Noise Tomography beneath the Banda Basin reveals new insights into the Arc-Continent Collision Zone. *Geophys. Res. Lett.*, 2025. Under review
- [4] **H. A. Nguyen** and A. Tura. Seismic Traveltime Inversion with Quantum Annealing. *Sci. Rep.*, 2025. Under revision - preprint: <https://arxiv.org/abs/2412.06611>
- [5] V.H. Nguyen, T.D. Pham, **H.A. Nguyen**, T.L. Mai. Molecular Dynamics-Based Analysis of Cavity Distribution in GeO<sub>2</sub> Glass: A Novel Computational Method ([Preprint](#))

- [6] V. H. Nguyen and **H. A. Nguyen**. Crystallization of Liquid SiO<sub>2</sub> under Compression: A Molecular Dynamics Simulation. *Pramana - J. Phys.*, 2024, doi: [10.1007/s12043-024-02839-7](https://doi.org/10.1007/s12043-024-02839-7)
- [7] **H. A. Nguyen** and V. H. Nguyen. Study the structure of MgSiO<sub>3</sub> system under compression by using ring statistics and Voronoi analysis. *Physica Scripta*, 2023, doi: [10.1088/1402-4896/acc5b7](https://doi.org/10.1088/1402-4896/acc5b7)
- [8] V. H. Nguyen, **H. A. Nguyen**, T. Iitaka, T. L. Mai. Computer simulation of phosphate-silicate and calcium phosphate-silicate systems. *Physica Scripta*, 2023, doi: [10.1088/1402-4896/acd4fb](https://doi.org/10.1088/1402-4896/acd4fb)
- [9] **H. A. Nguyen**, H. S. Nguyen and V. H. Nguyen. Pressure-induced glassy networks of enstatite and forsterite, 2022. *VNU J. Sci. Math. - Phys.*, 2023, doi: [10.25073/2588-1124/vnumap.4767](https://doi.org/10.25073/2588-1124/vnumap.4767)
- [10] T. H. A. Pham, H. H Doan, Q. M. Ta, T. L. Mai, and **H. A. Nguyen**. Some results of seismic travel-time reflection tomography study. *Petrovietnam J.*, 10:4 –16, 2021, doi: [10.47800/PVJ.2021.10-01](https://doi.org/10.47800/PVJ.2021.10-01)
- [11] H. S. Nguyen, **H. A. Nguyen**, H. K. Pham, T. Iitaka, and V. H. Nguyen. Topology of SiO<sub>x</sub> -units and glassy network of magnesium silicate glass under densification: correlation between radial distribution function and bond angle distribution. *M. Simul. Mater. Sci. Eng.*, 2020, doi: [10.1088/1361-651X/ab9bb4](https://doi.org/10.1088/1361-651X/ab9bb4)
- [12] H. S. Nguyen and **H. A. Nguyen**. Structural simulation of Mg<sub>2</sub>SiO<sub>4</sub> under compression. *VNU J. Sci. Math - Phys*, 2020, doi: [10.2138/am-2000-1015](https://doi.org/10.2138/am-2000-1015)