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## PROFILE

PhD candidate in applied mathematics working at the interface of inverse problems, computational imaging, and machine learning. My research designs fast, large-scale reconstruction methods for 3D photoacoustic tomography (PAT), carried out jointly between the Institut de Mathématiques de Toulouse (France) and A\*STAR / IPAL (Singapore). Expected thesis defense: spring 2028.

## CURRENT POSITION

**2024 - 2028**    **PhD Candidate in Applied Mathematics**  
*IMT, Université de Toulouse, France    &    BII, A\*STAR / IPAL, Singapore.*

## EDUCATION

**2024 - 2028**    **PhD in Applied Mathematics** (in progress), Université de Toulouse, France — joint program with A\*STAR, Singapore.  
*Inverse problems, computational imaging, and deep learning for 3D photoacoustic tomography.*

**2021 - 2024**    **Engineering Degree (Master 2) in Applied Mathematics**, INSA Toulouse, France. Department of Mathematical & Modeling Engineering (GMM).  
*Focus on statistics, optimization, and machine learning; coursework in inverse problems, signal/image processing, and high-dimensional data analysis.*

**2019 - 2021**    **Preparatory Classes for Grandes Écoles (CPGE)**, Hue University of Education, Vietnam.  
*Two-year intensive program in mathematics and physics, preparing for the competitive entrance examinations of French engineering schools.*

**2016 - 2019**    **Baccalaureate in Mathematics**, Quoc Hoc - Hué High School for the Gifted, Vietnam.  
*Specialized mathematics track; graduated with honors.*

## PROFESSIONAL EXPERIENCE

**May - June 2025**    **Visiting Research Stay — Photoacoustic Image Reconstruction**  
*BII, IPAL, A\*STAR, Singapore.*

**Mar - Aug 2024**    **Internship — Image Processing & Computer Vision**  
*Cerema Occitanie, France.*

**June - Sept 2023**    **Internship — Image Processing & Inverse Problems**  
*Institut de Mathématiques de Toulouse (IMT), France.*

## RESEARCH OVERVIEW

### Large-scale reconstruction methods for 3D photoacoustic tomography (PAT)

*PhD thesis — IMT Toulouse & A\*STAR / IPAL Singapore, 2024–2028. Supervisors: C. Chaux, P. Escande, H. K. Lee.*

- Designing fast, accurate reconstruction methods — combining inverse problems, optimization, and deep learning — to deploy a novel 3D PAT scanner for biomedical imaging.
- Developed a combined Total Variation–Cauchy regularization for PAT image reconstruction (published at GRETSI 2025).
- Modeling the electrical impulse response of the 3D PAT system and implementing efficient forward/adjoint operators for large-scale data.
- In collaboration with the A\*STAR team, exploring deep learning–based reconstruction for large-scale 3D PAT data.

### Inverse problems in photoacoustic tomography

*Research internship — IMT Toulouse, France, 2023. Supervisor: P. Escande.*

- Implemented optimization algorithms to solve inverse problems in PAT.
- Built a blood-vessel image simulator for synthetic training data and trained deep neural networks for reconstruction (PyTorch).

### Computer vision for road-safety analysis

*Research internship — Cerema Occitanie, France, 2024. Supervisors: G. Saint-Pierre, P. Salmane.*

- Analyzed road-user behavior from aerial / smart-camera data using object detection and trajectory extraction.
- Built a computer-vision pipeline for road-safety risk analysis (Python, deep learning); co-authored a paper at IEEE ICPRS-24.

## TEACHING EXPERIENCE

**2025 - 2026**

### Teaching Assistant — Optimisation (M1 Graduate Course)

*Université Toulouse III - Paul Sabatier (24h TD, 12h TP)*

Led tutorials and lab sessions on continuous and convex optimization: gradient and descent methods, constrained optimization and KKT conditions, with numerical implementation in Python.

**2024 - 2025**

### Teaching Assistant — Fourier Analysis and Signal Theory (L3 Undergraduate Course)

*Université Toulouse III - Paul Sabatier (30h TD)*

Led tutorials on Fourier series and transforms, sampling and convolution, and their application to signal filtering and spectral analysis.

## PUBLICATIONS & PRESENTATIONS

### Publications

1. **T-T. Do**, C. Chaux, P. Escande, J. Gâteau, “Reconstruction d’images en tomographie photoacoustique avec régularisation combinée variation totale - Cauchy,” *Published at XXXe Colloque GRETSI 2025*.
2. J. M. Rico Velázquez, P. H. Salmane, G. Saint-Pierre, L. Khoudour, **T. T. Do**, E. Martin, “Evaluation of road users trajectories from aerial-view data for risk analysis,” *Published at 14th International Conference on Pattern Recognition Systems (ICPRS), 2024*.

### In Preparation

1. **T-T. Do**, et al., “Implementations of photoacoustic tomography models,” (*in preparation*).
2. **T-T. Do**, et al., “Electrical impulse response for 3D photoacoustic tomography models,” (*in preparation*).

### Oral Presentations & Posters

- **Poster**, *Large-scale reconstruction methods for high-quality 3D photoacoustic imaging*, SinFra 2026, Singapore (Jun. 2026).
- **Poster**, *Journées modèles proxy et co-conception*, Institut Henri Poincaré, Paris, France (Sept. 2025).
- **Talk**, *XXXe Colloque GRETSI*, Strasbourg, France (Aug. 2025).

## TECHNICAL SKILLS & LANGUAGES

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|-----------------------------|---------------------------------------------------------------|
| <i>Programming</i>          | Python, C/C++, CUDA, MATLAB, R.                               |
| <i>Scientific computing</i> | PyTorch, NumPy/SciPy, Scikit-Learn, Matplotlib.               |
| <i>Tools</i>                | Git, Docker, Linux, L <sup>A</sup> T <sub>E</sub> X, Jupyter. |
| <i>Languages</i>            | Vietnamese (native), English (professional), French (fluent). |

## OTHER INTERESTS

|               |                                   |
|---------------|-----------------------------------|
| <i>Sports</i> | Football, racket sports, running. |
| <i>Music</i>  | Guitar, pop music.                |
| <i>Other</i>  | Travelling, photography.          |