Sékou-Oumar Kaba

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Machine learning PhD student with a background in physics and experience in the data science industry, my research interests include **AI for science**, **Geometric Deep Learning**, **Graph Representation Learning**.

Education

Doctor of Philosophy in Computer Science — **Montréal**
McGill University — *2020 - 2024*
Cumulative GPA : 3.9 / 4.0
Supervisor: Prof. Siamak Ravanbakhsh
- Designing deep learning models that leverage symmetry in crystaline materials for property prediction.

Master of Science in Physics — **Sherbrooke**
Université de Sherbrooke — *2016 - 2018*
GPA : 4.1 / 4.3
Supervisor: Prof. David Sénéchal
- Conducted numerical simulations on quantum lattice models to study unconventional superconductivity.

Bachelor of Science in Physics — **Québec**
Université Laval — *2013 - 2016*

Research experience

Research intern in artificial intelligence — **Montréal**
Mila - Quebec Artificial Intelligence Institute — *2019 - 2020*
Supervisor: Prof. Yoshua Bengio
- Implemented deep learning models for material property prediction. Performed predictions on a database of existing materials to identify promising candidates for magnetic refrigeration.

Research intern in neuroscience — **Québec**
CERVO Brain Research Center (Formerly CRIUSMQ) — *2015*
Supervisor: Prof. Robert Bonin
- Designed and performed optogenetics and behavioural experiments on mice with the goal of studying the MrgprB4 expressing neurons, suspected to play a role in chronic pain.

Industry experience

Scientific developer — **Montréal**
OODA Technologies — *2018 - 2019*
- Full-stack work on data collection, analysis, and visualization programs, with applications in geolocation and computer vision. Tested, debugged, and documented software products.

Data scientist — **Montréal**
The Brane — *2018 - 2019*
- Scraped and processed data from various scientific databases to populate knowledge graphs. Engineered ontologies for the extracted data.

Publications

Journal articles:

(Under review at Physical Review Materials) S.-O. Kaba, B. Groleau-Paré, M.-A. Gauthier, A.-M. Tremblay, S. Verret, and C. Gauvin-Ndiaye. *Prediction of large magnetic moment materials with graph neural*

networks and random forests, 2021.

S.-O. Kaba and D. Sénéchal. *Group-theoretical classification of superconducting states of strontium ruthenate.* Phys. Rev. B, 100:214507, 2019.

Conference papers:

M. Pezeshki, S.-O. Kaba, Y. Bengio, A. Courville, D. Precup, and G. Lajoie. *Gradient starvation: A learning proclivity in neural networks.* In Thirty-Fifth Conference on Neural Information Processing Systems, 2021.

Presentations:

Zoom sur la recherche en physique de la matière condensée. SAPHARI Symposium, Montréal, Canada, 2019.

Suerconductivity in strontium ruthenate with quantum cluster methods. Canadian Graduate Quantum Conference, Vancouver, Canada, 2018.

Invited talks and panels:

FICSUM, Canada, 2022.

IVADO, Canada, 2022.

Awards and achievements

- Google DeepMind PhD Scholarship *2021*
- IVADO PhD Excellence Scholarship *2021*
- Google DeepMind Masters Scholarship *2020*
- Best presentation award, Canadian Graduate Quantum Conference *2018*
- Laureate of the Acfas science popularization contest *2018*

Technical skills

Programming: Python, Java, JavaScript **Environnment**: Mac OS, Linux, Windows

Technologies: Pytorch, Git, LaTeX, MongoDB, ArangoDB, React, Spring, Flask

Other experience

Teaching

Teaching assistant **Sherbrooke**
Université de Sherbrooke *2017*
Course: Statistical Mechanics I
- Prepared and taught weekly tutorial sessions using an active learning approach

Science Instructor **Québec**
Cégep de Sainte-Foy *2013 - 2015*

Outreach

Science communication consultant **Montréal**
Acfas *2019 - 2021*

Radio host **Montréal**
CISM (Montréal) and CFAK (Sherbrooke) *2018*
- Co-hosted the weekly radio show *Aujourd'hui, c'est déjà demain*, aired on two radio stations.

Science popularizer **Québec**
Boîte à science *2014*

Community service

Laboratory representative **Montréal**
Mila - Quebec Artificial Intelligence Institute *2020 - 2022*

Student Mentor — **Montréal**
Projet SEUR — *2019 - 2021*

Vice President External — **Sherbrooke**
Regroupement étudiant des chercheurs en sciences de l'Université de Sherbrooke — *2017 - 2018*

Head of communication — **Sherbrooke**
Women in Physics Canada Conference — *2018*

Vice President Academic — **Québec**
Association des étudiants de physique de l'Université Laval — *2015 - 2016*