

Rupeng Li

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📄 [rupengli.github.io](https://github.com/rupengli)

🔍 [Google Scholar Profile](#)

Current Position

2022–Present **Lecturer**, *China University of Petroleum (Beijing)*, China.

Education

- 2017–2022 **PhD, Petroleum Engineering**, *The University of New South Wales*, Australia,
• Supervisor: [Christoph Arns](#), [Igor Shikhov](#)
• Research focus: Bayesian optimization, inverse problems, NMR for porous media.
- 2013–2017 **BEng, Petroleum Engineering**, *China University of Petroleum (East China)*,
• GPA – 3.94/4.00, Ranking 1/432
• Exchange student at UNSW, Spring 2017.

Research Interests

I am interested in building efficient and scalable probabilistic models for inverse problems arising from parameter estimation in core analysis, groundwater management, etc, where the optimal parameter is derived when the perfect match between experiments and expensive black-box simulations is achieved. Currently, I focus on developing practical multi-objective Bayesian optimization approaches to estimation of key physical parameters under various physical constraints.

Publications

Journal Articles

- 2022 **Bayesian optimization with transfer learning: A study on spatial variability of rock properties using NMR relaxometry**
Rupeng Li, Igor Shikhov, and Christoph Arns
Water Resources Research, [top journal in hydrology](#) [AGU]
- 2022 **A Bayesian optimization approach to the simultaneous extraction of intrinsic physical parameters from T_1 and T_2 relaxation responses**
Rupeng Li, Igor Shikhov, and Christoph Arns
SPE Journal, [#1 in petroleum engineering](#) [OnePetro]
- 2022 **Tuning the intentional corona of cerium oxide nanoparticles to promote angiogenesis via fibroblast growth factor 2 signalling**
Lu Fu, **Rupeng Li**, Whitelock John, and Megan Lord
Regenerative Biomaterials [OUP]
- 2021 **Solving multiphysics, multiparameter, multi-modal inverse problems: an application to NMR relaxation in porous media**
Rupeng Li, Igor Shikhov, and Christoph Arns
Physical Review Applied [APS]

- 2021 **Mechanisms of confining pressure dependence of resistivity index for tight sandstones by digital core analysis**
Hongyi Dai, Igor Shikhov, **Rupeng Li**, and Christoph Arns
SPE Journal [\[OnePetro\]](#)
- 2021 **A numerical study of field strength and clay morphology impact on NMR transverse relaxation in sandstones**
Yingzhi Cui, Igor Shikhov, **Rupeng Li**, Shitao Liu, and Christoph Arns
Journal of Petroleum Science and Engineering [\[Elsevier\]](#)
- 2020 **A topology-based single-pool decomposition framework for large-scale global optimization**
Xiaoming Xue, Kai Zhang, **Rupeng Li**, Liming Zhang, Chuanjin Yao, Jian Wang, and Jun Yao
Applied Soft Computing [\[Elsevier\]](#)
- 2018 **Relaxation and relaxation exchange NMR to characterise asphaltene adsorption and wettability dynamics in siliceous systems**
Igor Shikhov, **Rupeng Li**, and Christoph Arns
Fuel [\[Elsevier\]](#)
- [Working Papers](#)
- In Print **Practical multi-objective Bayesian optimization algorithms for removing the effect from the internal magnetic field for NMR measurement of saturated porous media**
Rupeng Li, Igor Shikhov, and Christoph Arns
• to be added.
- In Print **Surface relaxivity as a function of temperature: Estimation and prediction of dynamically-changing surface properties of porous media using multi-objective Bayesian optimization**
Rupeng Li, Igor Shikhov, and Christoph Arns
• to be added.
- In Print **On the choice of the regularization parameter for NMR T_2 inversion**
Rupeng Li, Igor Shikhov, and Christoph Arns
• NMR core analysts are always confronted with choosing the best regularization parameter for inversion of NMR T_2 decays into T_2 distributions, balancing the informativeness and smoothness of T_2 distributions. However, there is no unified method that performs well under various situations. We propose to be added
- [Conference Proceedings](#)
- 2023 **A Bayesian optimization approach to the extraction of intrinsic physical parameters from T2 relaxation response**
Rupeng Li, Igor Shikhov, and Christoph Arns
International Symposium of the Society of Core Analysts, Austin, Texas [\[E3S\]](#)
- 2017 **T_2 -store- T_2 Relaxation Exchange NMR to Characterize Effect of Asphaltenes on Wettability Dynamics in Siliceous Systems**
Igor Shikhov, **Rupeng Li**, and Christoph Arns
International Symposium of the Society of Core Analysts, Vienna, Austria [\[jgmaas\]](#)

Talks

- 2022 **A Bayesian optimization approach to the extraction of intrinsic physical parameters from T_2 relaxation responses**
Rupeng Li, Igor Shikhov, and Christoph Arns
Oral presentation at the 36th International Symposium of the Society of Core Analysts (SCA), Austin, Texas
- 2022 **Determination of intrinsic physical properties of porous media by solving inverse problems in Laplace NMR relaxometry using Bayesian optimization**
Rupeng Li, Igor Shikhov, and Christoph Arns
Poster presentation at the 15th International Bologna Conference on Magnetic Resonance in Porous Media (MRPM), Hangzhou, China
- 2020 **Effective parameter identification via NMR experiment and simulation using multi-task inverse solution workflow**
Rupeng Li, Igor Shikhov, and Christoph Arns
Oral presentation at the 12nd Annual Meeting of Interpore, Qingdao, China
- 2019 **Identification of surface relaxivities and effective diffusion coefficients governing relaxation processes in porous media by matching T_2 distributions through Bayesian optimization**
Rupeng Li, Igor Shikhov, and Christoph Arns
Oral presentation at the 12nd Australia and New Zealand society for Magnetic Resonance conference (ANZMAG), Perth, Australia
- 2019 **Identification of physical properties governing relaxation process in saturated rocks by matching experimental T_2 distributions and CT-image based NMR simulation through SL-particle swarm optimization**
Rupeng Li, Igor Shikhov, and Christoph Arns
Poster presentation at the 5th International Conference on Magnetic Resonance Microscopy (ICMRM), Paris, France
- 2018 **Accelerated simulation of NMR T_1 relaxation in digitized porous media using first-passage equations**
Rupeng Li, Igor Shikhov, and Christoph Arns
Poster presentation at the 8th Biennial Western Sydney University Symposium on NMR, MRI and Diffusion, Sydney, Australia

Teaching

- 2023-Present Lecturer, Undergraduate Physics
• Prepared and delivered physics to a large class of 124 students
- 2023-Present Lecturer, Physics Experiments
• Created and delivered physical experiments: measurement of the wavelength of light, measurement of the speed of sound, etc
- 2022 Teaching Assistant, Undergraduate Physics
- 2022 Teaching Assistant, Physics Experiments

- 2018-2020 Teaching Assistant, PTRL3030 & PTRL5021, Reservoir Characterization
- Created and delivered simple and ordinary Kriging interpolation, stochastic simulation, up-scaling and their applications in geological modeling.

Grants and Awards

- 2022-2024 Early-Career Researcher Award
- *Geological parameter estimation using Bayesian optimization*
 - 500 researchers per year for oversea degree recipients
- 2022 Poster Presentation Award at 15th International Bologna Conference on Magnetic Resonance in Porous Media
- 2018 Poster Presentation Award at 8th NMR, MRI & Diffusion Symposium
- 2017-2022 UNSW Doctorate Scholarship
- 2016 4th place in SPE Asia Pacific Oil & Gas Conference and Exhibition Paper Contest
- 2016 Exchange Student Scholarship, UNSW & Chinese Scholarship Council
- 2014-2016 National Scholarship - 1/432, awarded 3 years in a role, CUPE

Programming skills

- Intermediate Python, Bash, C
- Experienced MATLAB