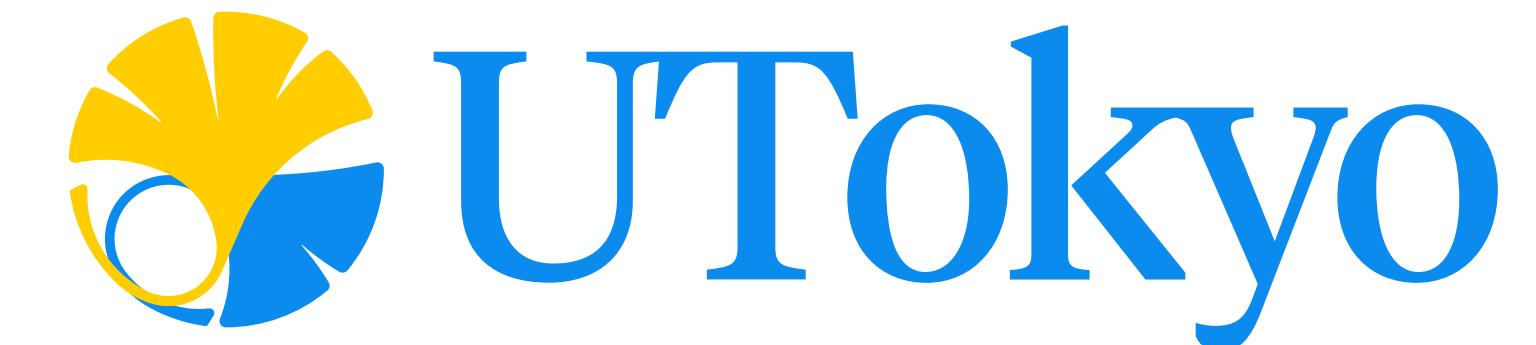


Self-introduction

- Rihito Sakurai from Tsukuba, Ibaraki
- JSPS fellow at University of Tokyo
- Bachelor's & Master's degree at Tokyo University of Science [Fukumoto group]
- Doctoral degree at Saitama University [Shinaoka group]

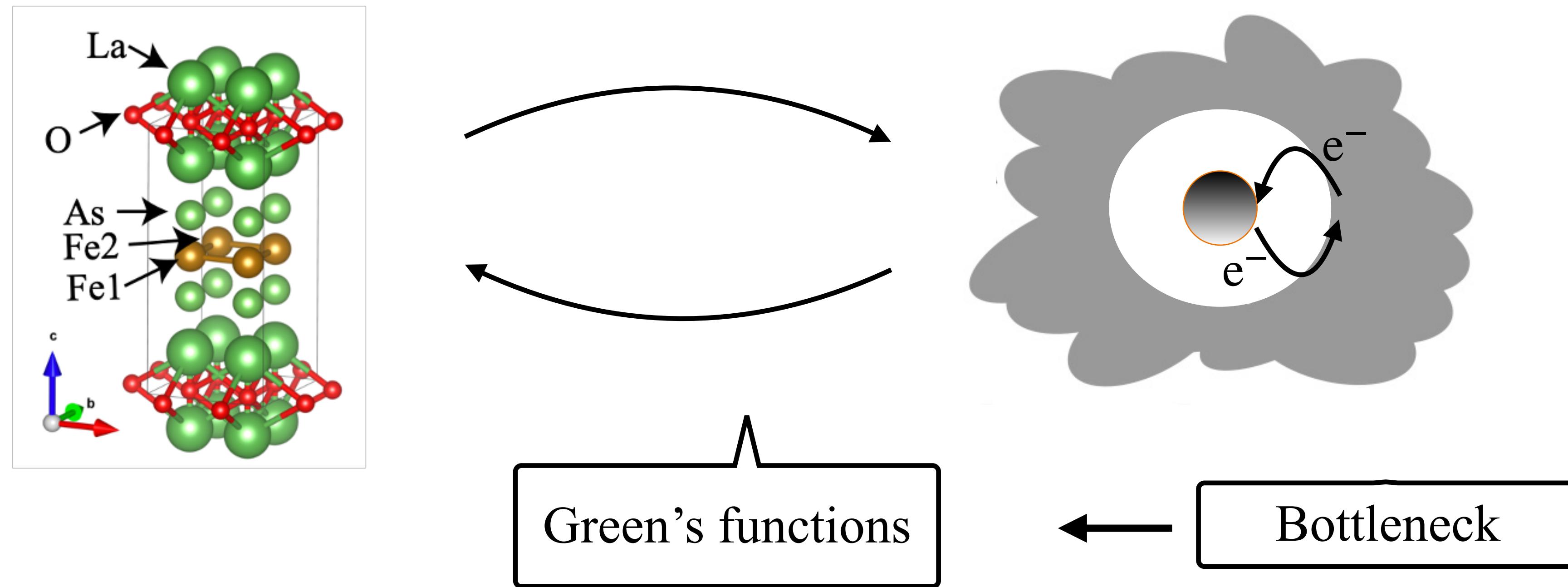
↓Tsukuba mountain



(45+30 min from Akihabara by TX+bus)

At doho park near JAXA & AIST

Embedding approach + quantum computations

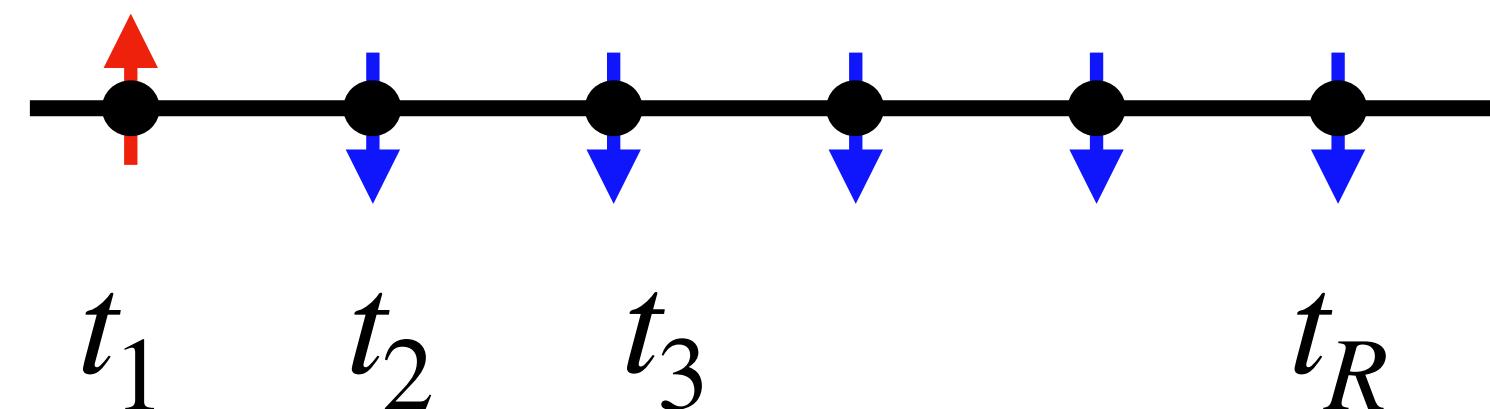


Software: QCMaterialNew for computing $G(\tau)$ with quantum-classical hybrid algorithms

R. Sakurai, W. Mizukami, H. Shinaoka, Phys. Rev. Research 4, 023219 (2022).

R. Sakurai, O. J. Backhouse, G. H. Booth, W. Mizukami, H. Shinaoka, to be published in PRR

Tensor4Fields



Quantics tensor train

I. V. Oseledets, Doklady Math. **80**, 653 (2009).
B. N. Khoromskij, Constr. Approx. **34**, 257 (2011).

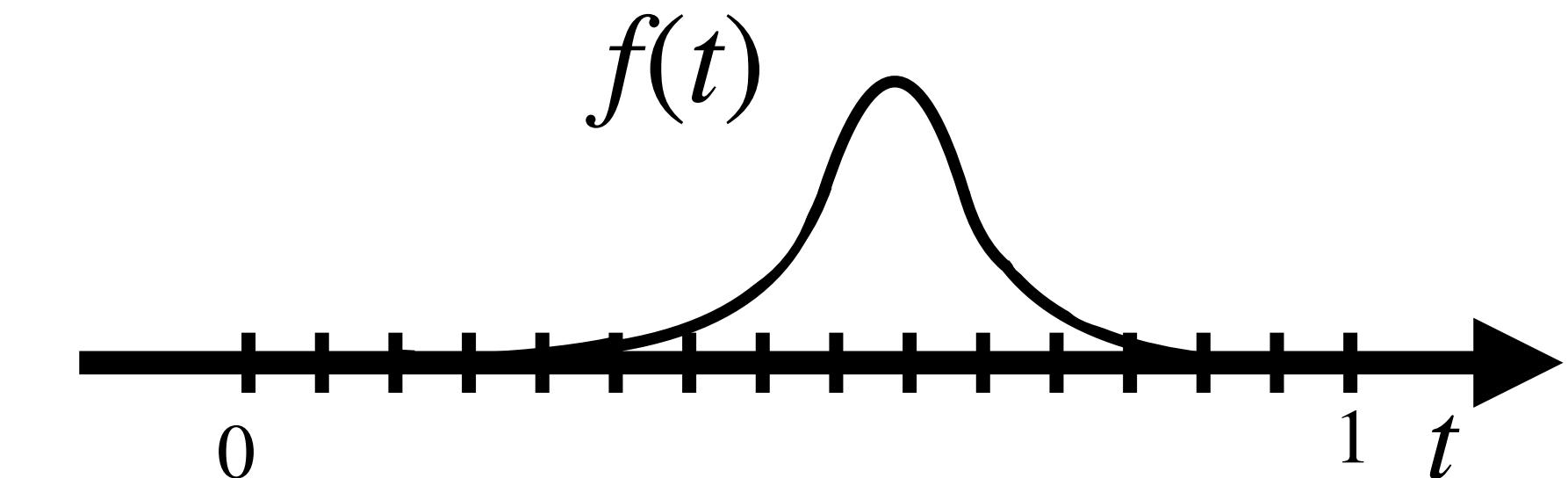


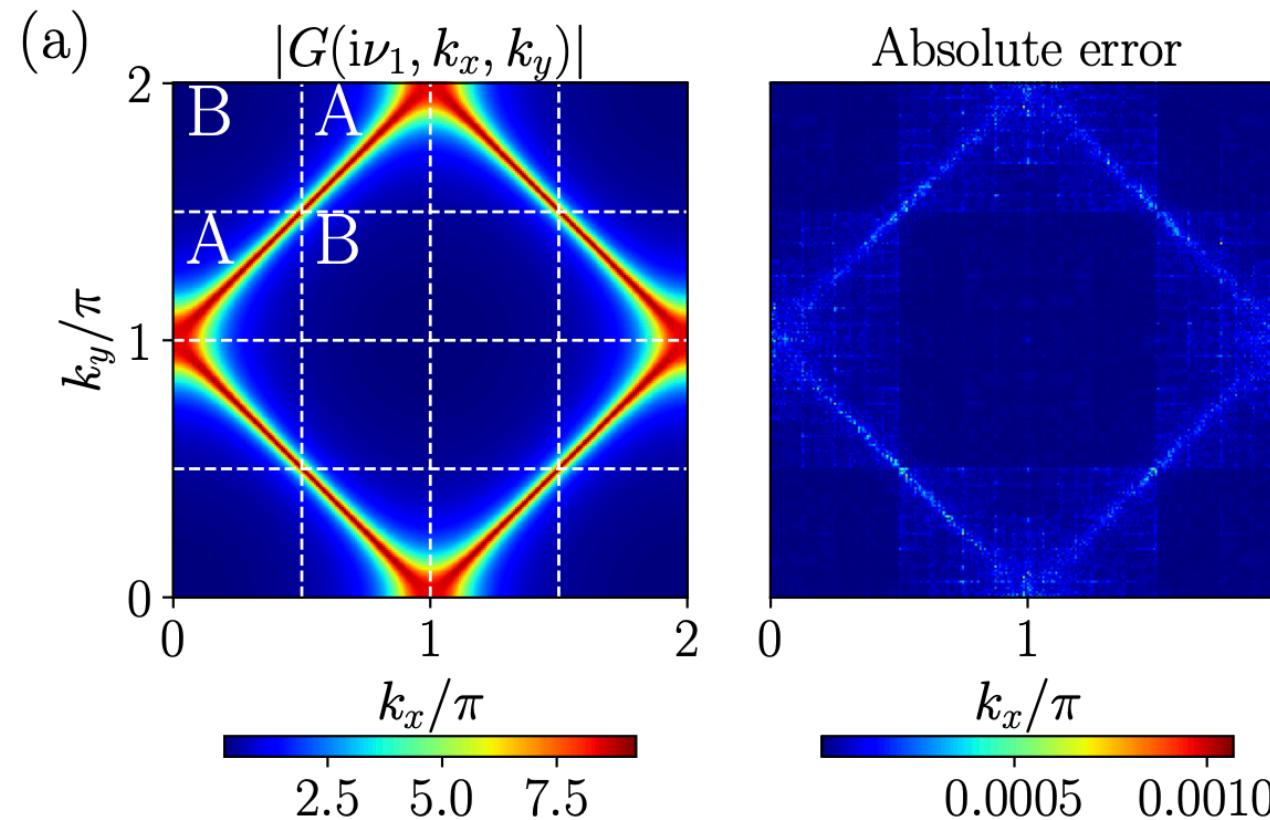
Image compression

J. I. Latorre arXiv:051003 (2003).



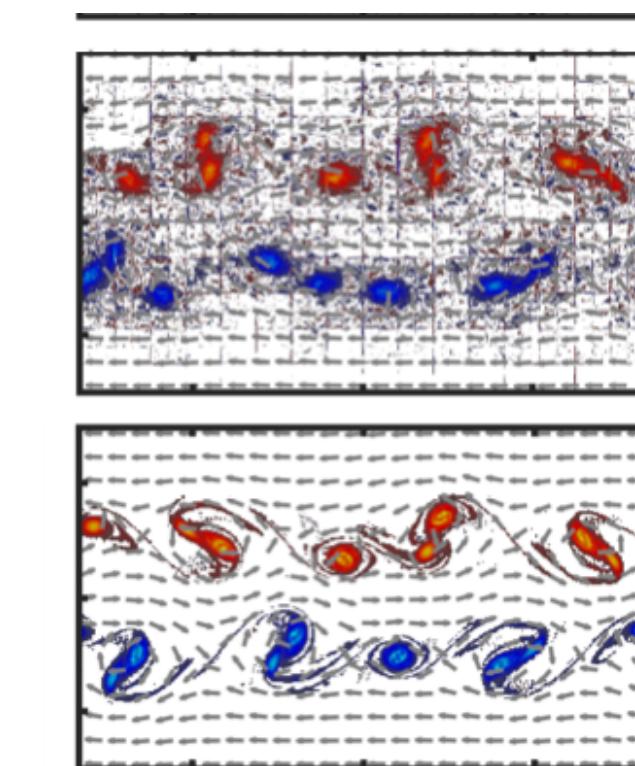
Quantum field theory

H. Shinaoka, ..., R. Sakurai, *et al*,
Phys. Rev. X **13**, 021015 (2023).



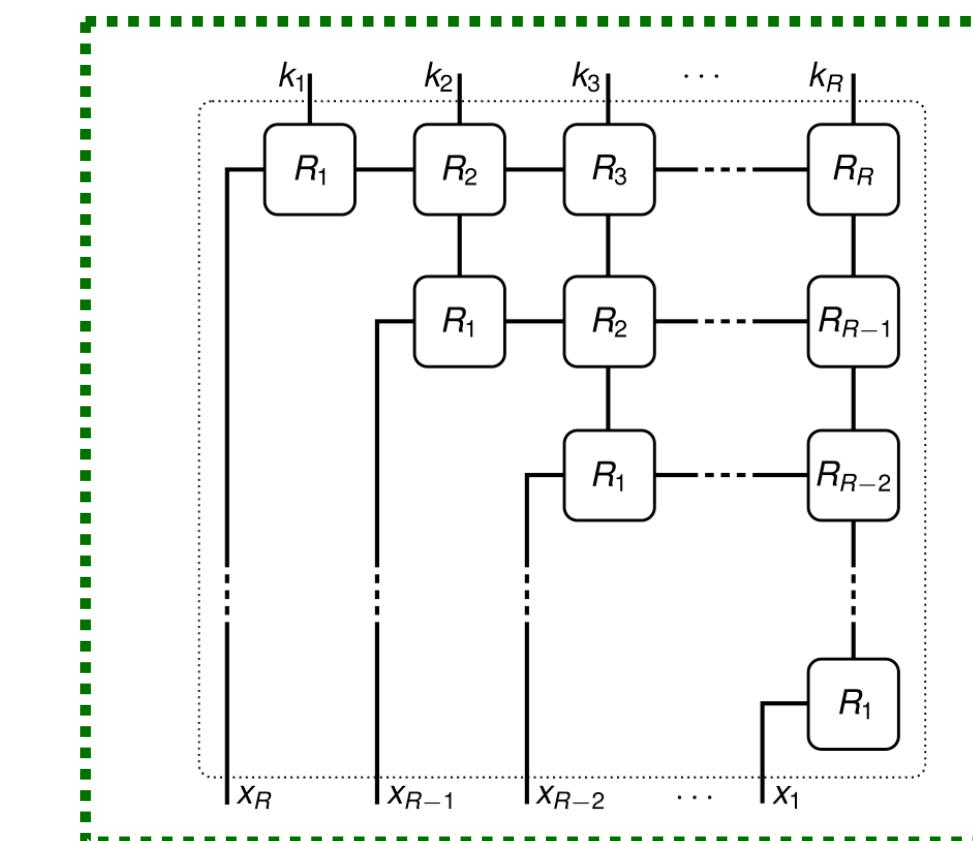
Navier-Stokes eq.

N. Gourianov, *et al*, Nat. Comput. Sci. **2**, 30 (2022).



Fourier transform

J. Chen *et al*, PRX Quantum **4**, 040318 (2023).



My research

Motivation:
Exploring possibility of tensor network in various fields

Keyword

1. Tensor train
2. Tensor cross interpolation
3. Quantics representation

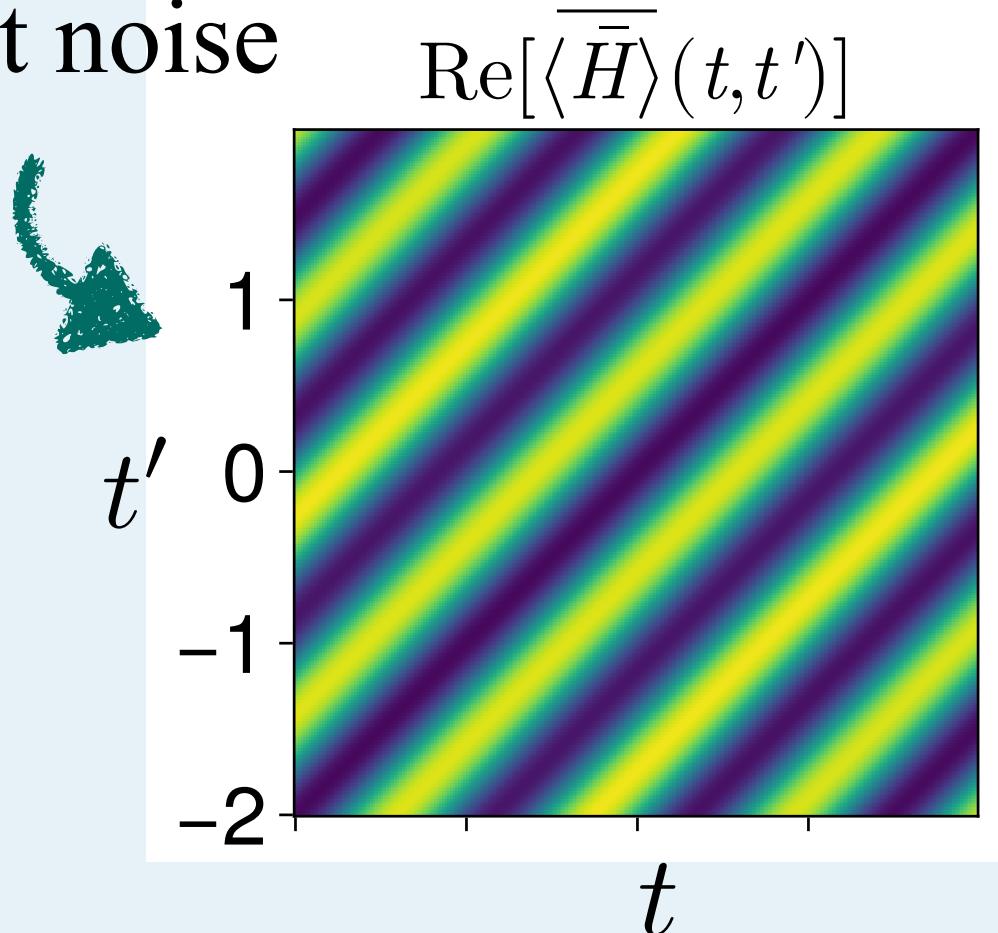
I. V. Oseledets, Linear Algebra and Its Applications **80** 653 (2009).

M. K. Ritter *et al.*, Phys. Rev. Lett. **132**, 056501 (2023).

Quantics tensor train

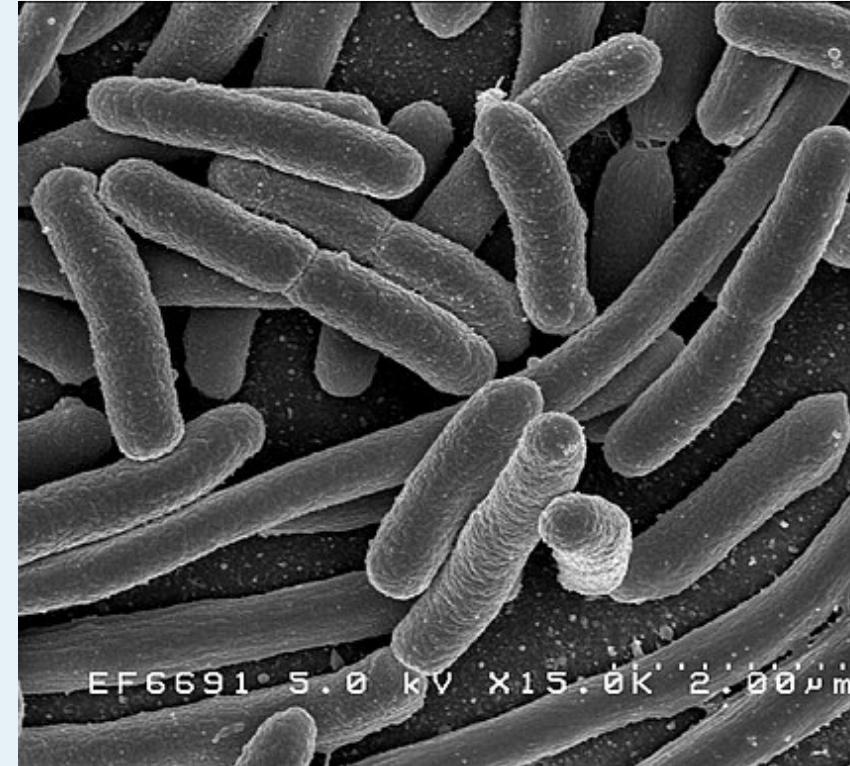
1. Function tomography

Shot noise



1. K. Sakaue, H. Shinaoka, **R. Sakurai**,
in preparation

2. Non-linear ODEs

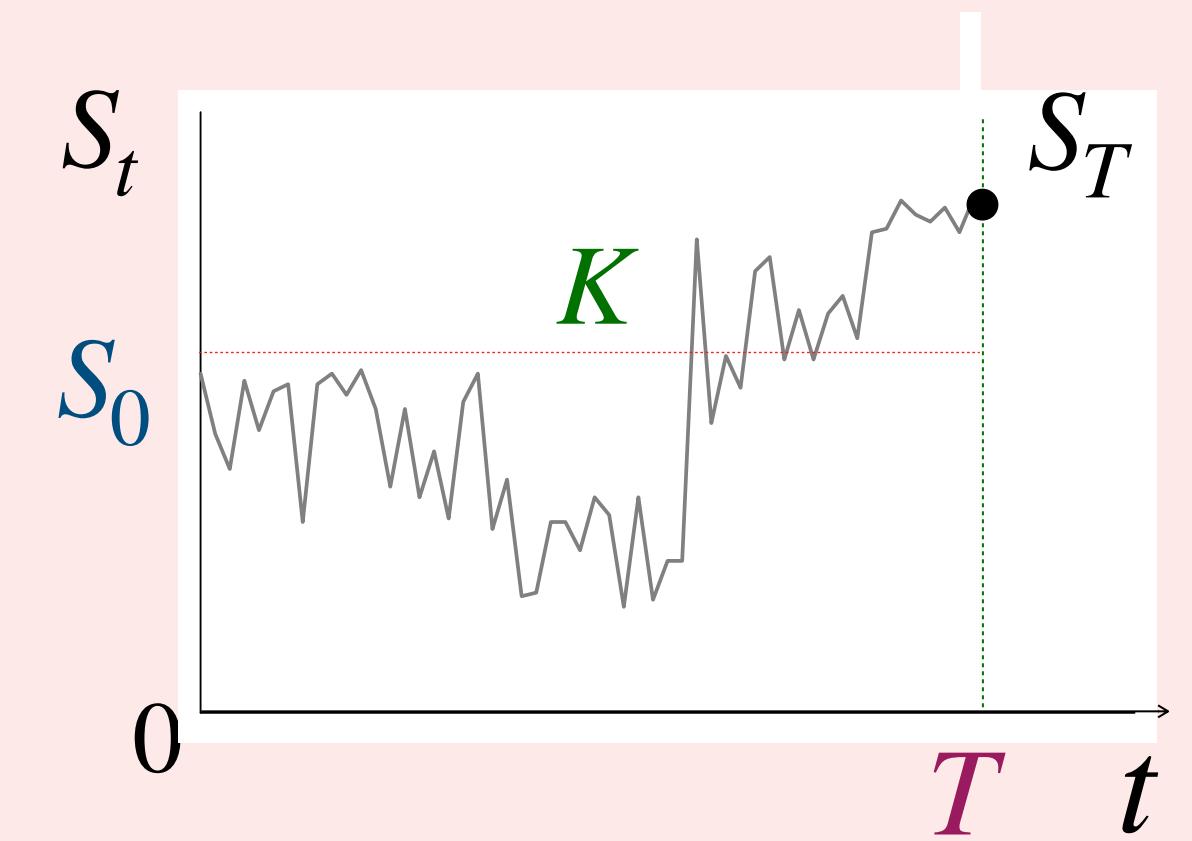


E. Coli. core metabolism

2. Collaborators: Yusuke Himeoka, Yuta Mizuno,
Wataru Mizukami, Hiroshi Shinaoka

Tensor train

3,4. SDEs



3. **R. Sakurai**, H. Takahashi, K. Miyamoto,
in preparation

4. Collaborators: Kayo Kinjo, Jun Okubo

Open question: Can quantics tensor train beat conventional methods ?

My perspective on quantics tensor train

