ANDREA KOUTA DAGNINO

Date of Birth: October 2004 ⋄ akd95@ou.ac.uk

EDUCATION

The Open University   *2017-Present*
BSc (Honours) in Mathematics
Predicted degree classification: First class

Level 1: MST124 (92%), MST125 (99%), M140 (84%), SM123 (92%)

Level 2: MST210 (88%), M208 (99%)

Level 3: SM358 (95%), SMT359 (100%), MST326, MS327, M337, SXP390

Deledda International School   *2015-2021*
MYP, IB DP1 Chemistry SL, IB DP1 Theory of Knowledge

RESEARCH/OUTREACH EXPERIENCE

Simulating Extended Hubbard models   May 2021 - August 2021
Research student

· Utilized Python libraries to simulate of strongly correlated systems using both exact and approximate diagonalization techniques (e.g. block-diagonalization and Lanczos).
· Studied the phase properties of Bosonic Hubbard models in 1D and compared with existing literature.
· Investigated the thermalization (and lack thereof) of the Extended Hubbard model, and identified models with weak ergodicity breaking.
· Accessed the computing cluster at the School of Physical Sciences to perform heavy computational tasks.
· Compiled a 40-page research report summarizing the main results from the project.

SXP390 Research project   October 2021 - idk
Research student

· To be determined

Expository writings   July 2021 - present
Independent work

· Independently researched areas of mathematical and theoretical physics outside of syllabus that interested me particularly.
· Topics include: symplectic geometry and geometric quantization (understanding the duality between poisson brackets in classical physics and commutators in quantum physics), observer dependent entanglement in the context of quantum field theory in curved space-time. stuff

Fisika lectures   July 2020 - present
Youtube channel

· Produced short lecture videos on Linear algebra, Statistical mechanics and Special relativity on my youtube channel.
· Total: 4300 views.

WRITTEN WORKS

Simulating Extended Hubbard Models   May 2021 - August 2021
Research report

· Research report presenting a thorough derivation of the Extended Hubbard model from the Born-Oppenheimer approximation, A review of the Eigenstate Thermalization hypothesis and its relation to random matrix theory. Original results on weak-ergodicity breaking in two Bose Hubbard models are discussed and analyzed.

The Undergraduate Companion to Theoretical Physics   September 2020 - Present
Lecture notes

· Produced a series of lecture notes on fundamental fields in physics:

1. Analytical and fluid mechanics (30 pages)

2. Electromagnetism (130 pages)

3. Quantum mechanics (340 pages)

4. Thermal and Statistical physics (120 pages)

5. Relativity (40 pages)

6. Mathematical methods (420 pages)

Deriving laws of Statistical, Analytical and Fluid mechanics   June 2019 - September 2019
Literature review

· As part of my MYP Personal Project, I produced an 80-page literature review contextualizing several day-to-day phenomena such as Blackbody radiation, capillary action, Navier-Stokes equation, spin-stabilised motion with a focus on visualizing the physical processes behind these effects.

CONFERENCES/SEMINARS

Statistical and Quantum Physics Autumn School 2021   27 September 2021 - 28 September 2021
Attendee

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The Annual Quantum Thermodynamics Conference 2021   4 October 2021 - 8 October 2021
Attendee

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COMPUTATIONAL SKILLS

LaTeX, Python, Julia, Maxima, Adobe Illustrator