Ka Ho (Andy) Lam

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Education

University of Virginia — Charlottesville, VA
Doctor of Philosophy in Astronomy — *May 2018 – May 2022 (expected)*
Master of Science in Astronomy — *Aug 2016 – May 2018*

The Chinese University of Hong Kong (CUHK) — Hong Kong
Bachelor of Science in Physics, First Class, Minor in Computer Science — *Sep 2012 – May 2015*

- Awards: Dean's List (2013-2015), CN Yang Scholarship (2013-2015)

Work Experience

University of Virginia — Charlottesville, VA
Graduate Research Assistant — *Aug 2016 – Present*

- Performed and analyzed magneto-hydrodynamics (MHD) simulations with the finite-volume method (FVM) on NASA's Pleiades Supercomputer and $>1,000$ threads using the `Athena` software
- Designed and developed, as the primary developer:
  - ray-tracing-based software, solving vector radiation transfer (VRT) equations
  - gravity solver for `Athena++`, enabling execution of high-performance radiative-hydrodynamics simulations
  - sink particle treatment compatible with adaptive mesh refinement (AMR), ensuring convergence of simulations, implemented in `Athena++`, the successor of `Athena` rewritten in `C++`

Academia Sinica Institute of Astronomy and Astrophysics — Taipei, Taiwan
Research Assistant — *Jun 2015 – Mar 2016*

- Implemented `Python` interface to the previously developed software, exploring time evolution of MHD models

Summer Research Internship — *Jul 2014 – Aug 2014*

- Developed a ray-tracing-based software analyzing MHD simulations, prototyped in `MATLAB` and implemented in `C++` for performance and interactive graphical user interface

Personal Projects

CNumpy – `C++` template library of multidimensional array containers

- Syntactic sugar: `ndarray<double, 3> arr(20, 30, 40)` vs `vector<vector<vector<double>>> arr(20, vector<vector<double>>(30, vector<double>(40)))`
- High-performance: take advantage of spatial locality, up to 30% faster
- Builtin `npy` file reader and writer; header only; no external library dependency

PostProcessedTracer – Numba-accelerated Lagrangian particle tracers for Eulerian fluid simulations

- Easily extendable with higher-order integrators; compatible with commonly used coordinate systems
- Builtin `O(N)` Poisson-disk sampler for spatial sampling

Technical Skills

- Proficient in object-oriented programming, parallel computing, data visualization, and working in Unix environments
- Advanced knowledge in `C/C++` and `Python`; experience in `CUDA`, `Git`, `MATLAB`, `MySQL`, `JavaScript`, and `HTML/CSS`
- Ability to debug complex multi-threaded software using debugger such as `LLDB` and `GDB`
- English (fluent), Cantonese (native), Mandarin (fluent)

Competitions

Google Kick Start Round G 2021	$113^{\text{th}}/7{,}233$
LeetCode Biweekly Contest 61	$11^{\text{th}}/9{,}137$
Google Hash Code 2021	$917^{\text{th}}/9{,}004$
Facebook Hacker Cup 2020	$496^{\text{th}}/17{,}957$
CUHK Data Structure Internal Competition 2013	2^{nd} place
Hong Kong Olympiad in Informatics 2012	**Gold Medal**