Hongbin **Ren**

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Education

UCAS (University of Chinese Academy of Sciences) *Beijing, China*
PH.D. CANDIDATE, THEORETICAL PHYSICS *Sept. 2015 - June. 2021*

NTU (National Taiwan University) *Taipei, China*
TRANSFER STUDENT, PHYSICS DEPARTMENT *Sept. 2013 - Jan. 2014*

SCU (Sichuan University) *Chengdu, China*
B.S. IN PHYSICS *Sept. 2011 - June. 2015*
add GPA and rank

Academic Experience

RESEARCH ASSISTANT AT INSTITUTE OF PHYSICS

I worked with Prof. Xi Dai and Prof. Lei Wang on applying machine learning method to first principle calculation, my work mainly focused on:
- Approximate kinetic energy functional for orbital free density functional theory
  - Save 80% training time by using automatic differentiation on Gaussian process's hyperparameters.
  - Increase robustness of functional derivative prediction on complex situations by designing an algorithm that jointly train Gaussian process and it's derivative process.
- Scientific machine learning in quantum chemistry
  - Allow flexible quantum mechanics programming in *Julia* and easy access to gradient information by developing **QuantumLang.jl** and integrating it with *Julia*'s 'source-to-source automatic differentiation tool.
  - Imrove the convergence rate of the Hartree Fock method by designing a density matrix based Hartree Fock algorithm.
  - Achieve same accuracy on a $2\times$ smaller basis set by implementing a fully variational Hartree Fock method based on **QuantumLang.jl**.
  - Obtain a $10\times$ speedup compared to a similar previous work by using **QuantumLang.jl**.

UNDERGRADUATE STUDENT IN SICHUAN UNIVERSITY

- I was supervised by Prof. Bingwei Long to study quantum few-body problem using renormalization group method
- I was supervised by Prof. Mingli Yang to study magnetism in transition metal cluster using first principle calculation and Monte Carlo simulation

Social Experience

PHYSICS TEACHER IN GAOSI EDUCATION CORPORATION

- Designed a systematic high school physics lecture notes and integrate *Python* programming into the tutorial to help students visualize the abstract physics concepts.
- Significantly improve the score of 30 students (total 70 students) in their mid-term and final exam by regularly assessing their learning condition, collecting feedback from them and their parents.
- Achieve a 80% class transfer rate and is among the top 5% of all the high school physics teachers.

Honors & Awards

INTERNATIONAL

2018	**Finalist**, DEFCON 26th CTF Hacking Competition World Final	*Las Vegas, U.S.A*
2017	**Finalist**, DEFCON 25th CTF Hacking Competition World Final	*Las Vegas, U.S.A*
2014	**Finalist**, DEFCON 22nd CTF Hacking Competition World Final	*Las Vegas, U.S.A*
2013	**Finalist**, DEFCON 21st CTF Hacking Competition World Final	*Las Vegas, U.S.A*
2011	**Finalist**, DEFCON 19th CTF Hacking Competition World Final	*Las Vegas, U.S.A*

DOMESTIC

2015	**3rd Place**, WITHCON Hacking Competition Final	*Seoul, S.Korea*
2017	**Silver Prize**, KISA HDCON Hacking Competition Final	*Seoul, S.Korea*
2013	**Silver Prize**, KISA HDCON Hacking Competition Final	*Seoul, S.Korea*

Presentation

DevFest Seoul by Google Developer Group Korea *Seoul, S.Korea*

PRESENTER FOR <HOSTING WEB APPLICATION FOR FREE UTILIZING GITHUB, NETLIFY AND CLOUDFLARE> *Nov. 2017*

- Introduced the history of web technology and the JAM stack which is for the modern web application development.
- Introduced how to freely host the web application with high performance utilizing global CDN services.

6th CodeEngn (Reverse Engineering Conference) *Seoul, S.Korea*

PRESENTER FOR <DEFCON 20TH : THE WAY TO GO TO LAS VEGAS> *Jul. 2012*

- Introduced CTF(Capture the Flag) hacking competition and advanced techniques and strategy for CTF

Extracurricular Activity

PoApper (Developers' Network of POSTECH) *Pohang, S.Korea*

CORE MEMBER & PRESIDENT AT 2013 *Jun. 2010 - Jun. 2017*

- Reformed the society focusing on software engineering and building network on and off campus.
- Proposed various marketing and network activities to raise awareness.

PLUS (Laboratory for UNIX Security in POSTECH) *Pohang, S.Korea*

MEMBER *Sep. 2010 - Oct. 2011*

- Gained expertise in hacking & security areas, especially about internal of operating system based on UNIX and several exploit techniques.
- Participated on several hacking competition and won a good award.
- Conducted periodic security checks on overall IT system as a member of POSTECH CERT.
- Conducted penetration testing commissioned by national agency and corporation.