Sayyed Farbod Rassouli

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Education

2021-2022 MSc in Quantum Fields and Fundamental Forces - Imperial College London
Course Representative

Jul 2021 Hadron Collider Summer School - University of Goettingen

2017-2021 MSci in Theoretical Physics - Royal Holloway, University of London
First Class Honours

Research Experience

Aug 2021 - Sep 2021 **"Disorded-Induced quantum spin liquids", Royal Holloway University of London**
Awarded EPMS scheme funding 4-weeks summer project. Supervisor: Jon Goff

- Structural diffuse neutron scattering has been observed from such a candidate **quantum spin liquid**
- I have used computer simulation (Python) to calculate the **defect structure** of $Y_2Ti_2O_{7-\delta}$ and for general pyrochlore structures using **diffuse neutron scattering**

Jan 2021 - Mar 2021 **"Calculations methods for hadron colliders: Next-to-leading order cross section for $q\bar{q} \to e^- e^+$" 69/100**
4th year Major Project. Supervisor: Dr. Nikolas Kauer

- Explained Asymptotic behaviour of **QCD** theory including Factorisation and Parton Distribution Functions (**PDF**)
- I calculated Leading Order and **Next-to-Leading Order** for the process. **Wick rotation** and **Pauli-Villars** Regulation methods used for Virtual Corrections. Two body and **Three-body** computations provided
- By showing the **explicit calculation** I was able to obtain predictions for the hadron colliders despite the proton's non-perturbative nature

Sep 2020 - Nov 2020 **"Extra dimensions: A unified picture for Physics beyond the Standard Model" 76/100**
4th year Research review. Supervisor: Dr. Nikolas Kauer

- Explained the **Kaluza-Klein idea** where both **compactifying on manifolds and on orbifolds** with the example of embedding **MSSM** into extra dimensions
- By using **D-Branes** and **Type I strings** in the context of large extra dimensions has been showed that the **fundamental scales** such as Planck, GUT and string scale **are not fixed** and can be lowered at TeV range introducing the Brane World scenario
- I have addressed the **Hierarchy problem** both in **flat** and **warped** extra dimensions in a **Randall-Sundrum (RS1)** scenario using **Anti deSitter** space

Sep 2019 - Nov 2019 **"Phenomenological and Theoretical structure of Higgs boson decays" 77/100**
3rd year project. Supervisor: Professor Stephen Gibson

- Explained the **Higgs mechanism** and Theoretically derived the function for the **Higgs loop-decay modes**
- I used ROOT and applied it to plot different graphs of decay channels of Higgs boson resulting with the **decay branching ratio**

Jun 2019 - Aug 2019 **National Physical Laboratories, Quantum Metrology Istitute**
Scientist, SEPnet Summer Placement

- Developed a Closed loop control For magneto transport measurement system, developing **circuits** and a **C++** program in Arduino signalling the magnet through **LabVIEW control**
- Developed a **new equation** in PID controller for particular magnet system **resolving** overshoot problem
- Developed a **library** in **C++** for Arduino using **Classes**, tuning the parameter of the **PID control**
- Circuit design and use of **3D printers** to construct end product

Teaching

Oct 2020 - Present **Educational Centre *giardino dei mille colori* Associazione C.e.L.u.S**
Tutor in Physics

- Actively teaching Physics and Maths for disadvantaged students of 6-18 year-old.

Sep 2017 - Oct 2020 **Private Teaching**
Music Theory and Music instrument teacher

- On request thought Persian musical instrument Ney and Violin
- On request thought Classical Music theory

Awards

Aug 2021 - Sep 2021 **Awarded EPMS scheme funding for 4-weeks summer project (1200£)**
Theoretical Research at Royal Holloway University of London

Jun 2019 - Aug 2019 **Awarded SEPnet Summer Placement funding for 8-weeks (2400£)**
Worked as research Scientist at National Physical Laboratories

Computing Skills

- Fluent in **C++**, **Python**, **ROOT**, **Mathematica wolfram**, **MATLAB** and **Bash**.
- Experienced in **machine learning** and **deep learning** in **python**.
- 4th year projects: Fluent in and in all major packages including **TikZ** and **Pgfplots**.
- 3rd year project: used **ROOT** in **C++** to analyse different **Higgs boson** decays and mechanism.
- 2nd year project : Building a **GUI** with **QT5** on **python** with **classes**, achieving **9/10**.
- 1st year project: Used and analysed **chaos theory** on **Mathematica wolfram** and Grapher on **Mac Os**.
- Created a **new library** for Tuning PID controls in **C++** applied on **Arduino**.