A Lecture in 2 Parts: 1. ORBYTS: Inspirational Research Partnerships for School Students from Historically-Excluded Groups and 2. Extraordinary X-rays from the Outer Planets

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The lecture will be split into two parts:

1. ORBYTS

In the UK, physics faces chronic diversity issues, shortfalls in subject-specialist teachers and 20% lower uptake beyond age 16 than in the 1980s. ORBYTS is a movement that partners researchers with schools to involve school children in active scientific research. Since 2017, ORBYTS has grown to 30 school-researcher partnerships, with 75% of ORBYTS school pupils from groups historically-excluded from physics. While the first research projects were exoplanets focussed, we now have researchers working with schools on: protostellar formation, molecular spectroscopy, planetary science, plasma physics, galaxy characterisation, Al, quasars, supernovae and more.

Through involvement in research and partnerships with relatable science role models, ORBYTS is providing positive change in school students’ attainment and is dispelling harmful stereotypes. Schools involved in the programme at age 14-16 report 100% increases in post-16 uptake of physics by girls and students from more than 40 ethnicities. Since 2017, the programme has enabled more than 150 school students to author published papers.

We welcome contact from anyone interested. We hope to continue to sustainably expand the programme to new researcher-school partnerships that can help make science more inclusive for all.

2. X-ray Observations of the Outer Planets

A revolution is happening in the field of planetary X-rays. In the last few years, there have been unprecedented campaigns totalling hundreds of hours of observations by the flagship NASA and ESA X-ray observatories (Chandra and XMM-Newton). Currently, ground-breaking X-ray instruments are travelling to Mercury on BepiColombo and soon to observe the Earth on the ESA/CAS SMILE spacecraft. This is shifting X-ray studies of planets from an enigmatic niche to an essential component of our multi-waveband exploration of other worlds.

So, what do X-ray images of planets look like and what do they reveal about environments,
properties and processes across our solar system? I provide an overview history of the field and highlight recent discoveries, with a particular focus on the outer planets and their moons. This will include recent observations in tandem with NASA’s paradigm-shifting Juno spacecraft, that reveal the physical processes responsible for some of Jupiter’s spectacular auroral displays and bizarre quasiperiodic pulsations. I also touch on the recent discovery of X-ray emissions from Uranus, before looking to what we can expect from the coming years.

Finally, I connect the two parts of the lecture by showcasing planetary X-ray research by school students.
