



**Ronald E. Hatcher**  
**Science on Saturday Lecture Series**  
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***When The Uncertainty Principle goes to 11...  
or How to Explain Quantum Physics with Heavy  
Metal***

**Philip Moriarty**  
**Professor, University of Nottingham,**  
**United Kingdom**

**ABSTRACT:**

There are deep and fundamental links between quantum physics and heavy metal.

No, really. There are.

Far from being music for Neanderthals, as it's too often construed, metal can be harmonically and rhythmically complex. That complexity is the source of many connections to the quantum world. You'll discover how the Heisenberg uncertainty principle comes into play with every chugging guitar riff, what wave interference has to do with Iron Maiden, and why metalheads in mosh pits behave just like molecules in a gas.

**BIOGRAPHY:**

Philip Moriarty is a professor of physics, a heavy metal fan, a keen air-drummer, and author of "When The Uncertainty Principle Goes To 11 (or How To Explain Quantum Physics With Heavy Metal)" (Ben Bella 2018). His research at the University of Nottingham focuses on prodding, pushing, and poking single atoms and molecules; in this nanoscopic world, quantum physics is all. Moriarty has taught physics for twenty years and has always been struck by the number of students in his classes who profess a love of metal music, and by the deep connections between heavy metal and quantum mechanics. A frequent contributor to the Sixty Symbols YouTube channel, which won the Institute of Physics' Kelvin Award in 2016 for "for innovative and effective promotion of the public understanding of physics", he has a keen interest in public engagement, outreach, and bridging the arts-science divide. Moriarty is a father of three — Niamh, Saoirse, and Fiachra — who have patiently endured his off-key attempts to sing along with Rush classics for many years. Unlike his infamous namesake, he has never been particularly enamored of the binomial theorem.