

## **ANTHONY LASENBY**

### *Geometric Algebra as a unifying language for Physics and Engineering and its use in the study of Gravity*

#### **Summary**

The aim of the first part of this lecture is to give an overview of the ability of Geometric Algebra (GA) to provide a unifying mathematical language for Physics and Engineering. Examples from several different fields will be given, including electromagnetism, rigid body dynamics, quantum mechanics and signal processing, and it will be shown how the availability of this common language aids in being able to work on advanced problems in multiple areas, emphasising common aspects and aiding geometrical intuition in each.

Then in the second half of the lecture, we specialise to the area of gauge theories and gravity, with the aim of showing that when equipped with an understanding of GA, hitherto apparently difficult subjects such as General Relativity, can become quickly accessible using the same GA techniques needed in engineering applications. In particular, we show how General Relativity can be regarded as a gauge theory in flat space, and suggest how an extension of the symmetries which are gauged can lead to a novel theory of gravity, with potential implications across a wide range of phenomena.