CANTAB CAPITAL INSTITUTE FOR THE MATHEMATICS OF INFORMATION

Department of Applied Mathematics and Theoretical Physics

and

Department of Pure Mathematics and Mathematical Statistics

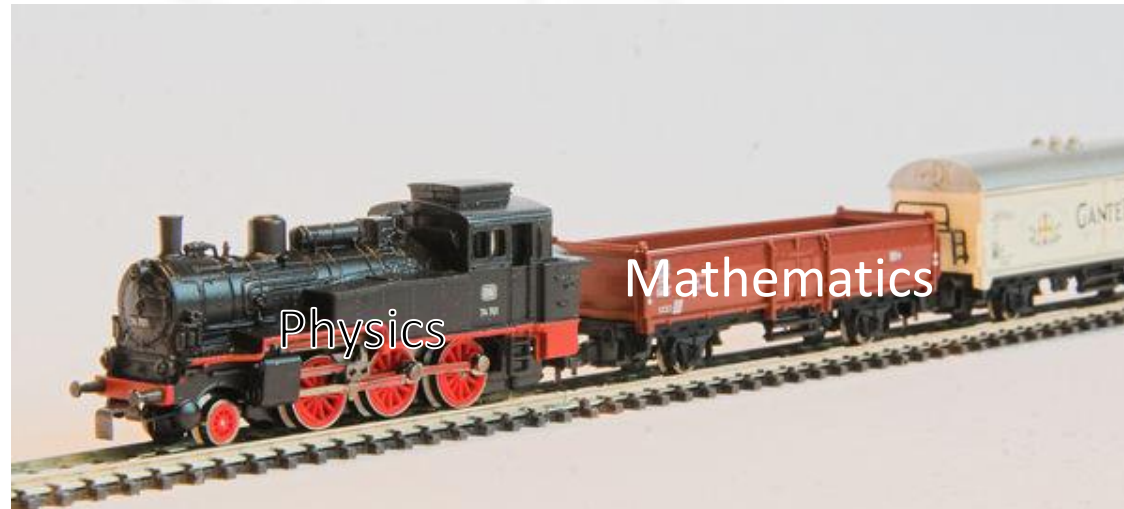# The scientific revolution of the early 18ᵗʰ century

Physics   Mathematics
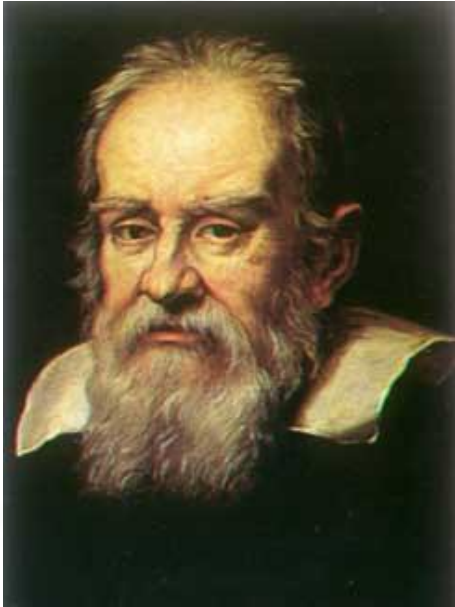
Illustration courtesy of A. Iserles

The information revolution

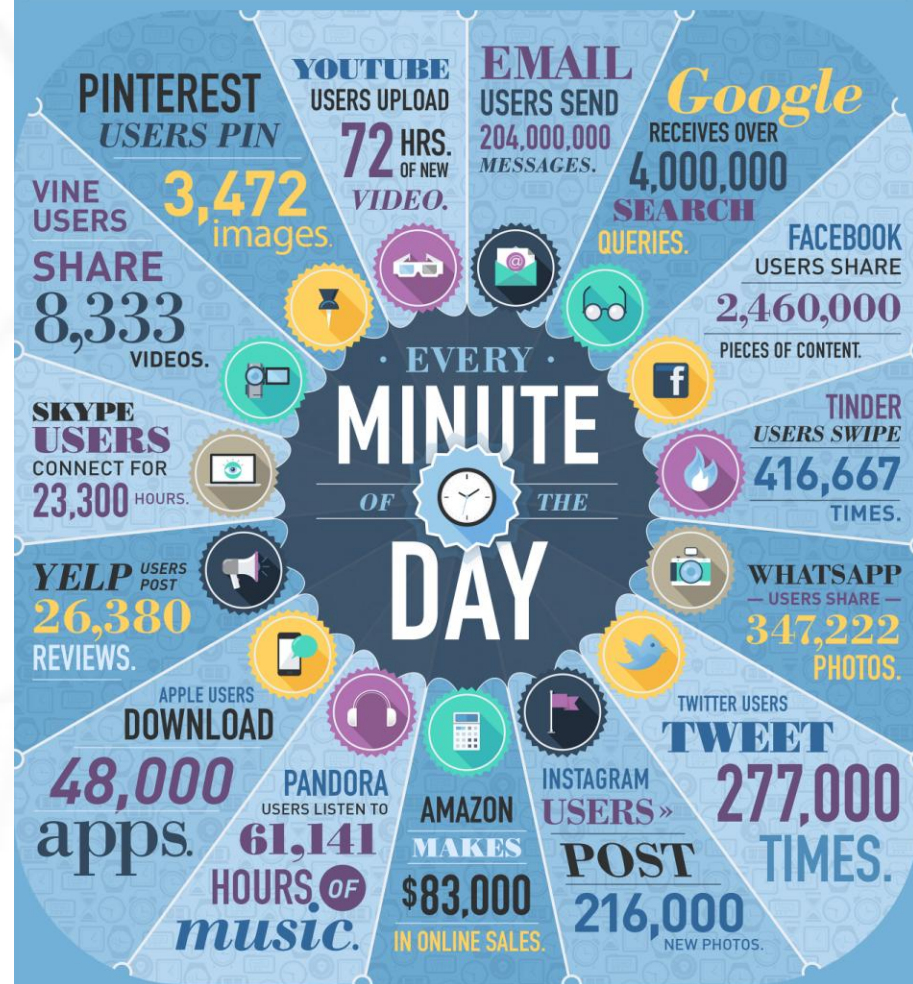The information revolution

Mathematics of Information

Mathematics

Data

Information

Statistics

CCIMI in numbers

- GBP 5 Mill donation from Cantab Capital Partners for initial 5 years

- Building on about 25 Faculty in Mathematics of Information

- 2 new lectureships: Welcome Hamza Fawzi!

- 3 PostDocs

- 6 PhD studentships per year: Welcome Edward Ayers, James Urquhart, Eric Hanson, Ferdia Sherry, Sven Wang, Samuel Power!

CCIMI in numbers

- Internal board: John Aston (DPMMS), Matt Killeya (Cantab), Gabriel Paternain (DPMMS), Nigel Peake (DAMTP), Carola-B. Schönlieb (DAMTP)

- Supported by strong international advisory board: Andrea Bertozzi (UCLA), Robert Calderbank (Duke University), David Hand (Imperial College London), Chris Rogers (University of Cambridge), Ulrike Tillmann (University of Oxford)

- And about 25 affiliated Faculty from DAMTP & DPMMS

Mathematics of Information
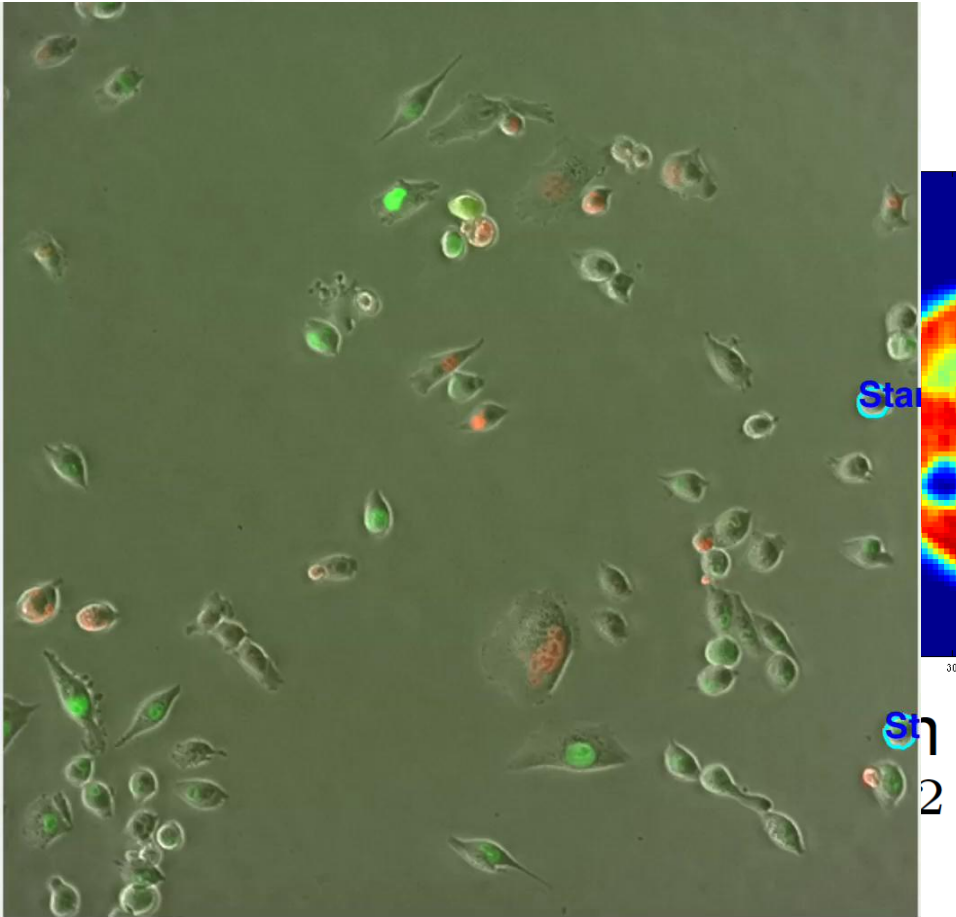
amplitude
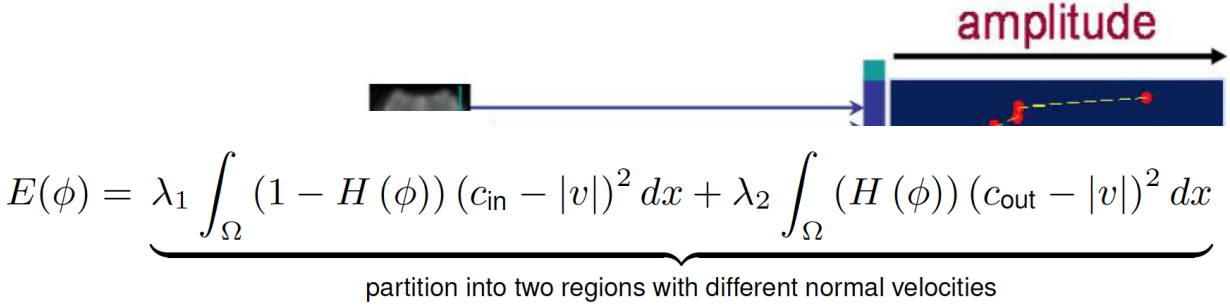
$$E(\phi) = \lambda_1 \underbrace{\int_\Omega (1 - H(\phi))(c_{\text{in}} - |v|)^2 \, dx + \lambda_2 \int_\Omega (H(\phi))(c_{\text{out}} - |v|)^2 \, dx}_{\text{partition into two regions with different normal velocities}}$$

$$+ \lambda_3 \underbrace{\int_\Omega g_{\text{grad}}(|\nabla f_\sigma(x)|) \, \delta(\phi(x)) \, |\nabla \phi(x)| \, dx}_{\text{stop contour at edges based on the gradient}}$$

$$+ \lambda_4 \underbrace{\int_\Omega g_{\sigma_{\text{loc}}}(f_\sigma(x)) \, \delta(\phi(x)) \, |\nabla \phi(x)| \, dx}_{\text{stop contour at edges based on the local std}}$$

$$+ \mu \underbrace{\int_\Omega \delta(\phi(x)) \, |\nabla \phi(x)| \, dx}_{\text{small contour length}}$$
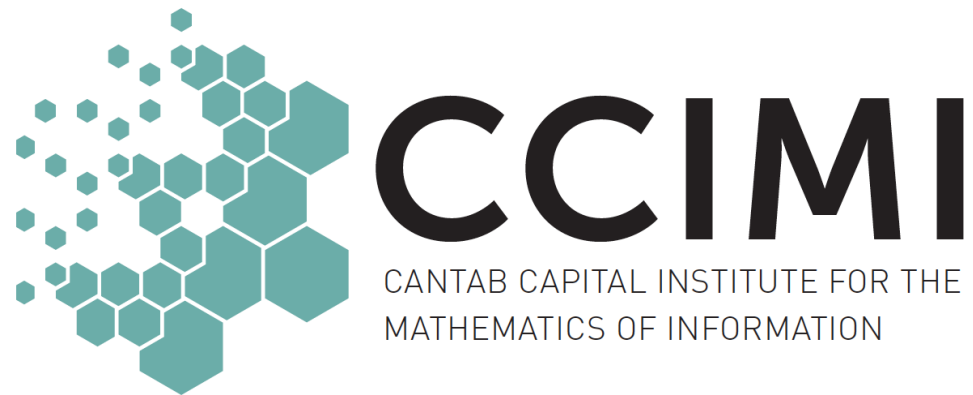
One voxel = One time series

voxel time course

DPMMS, Cambridge

DAMTP, Cambridge

Thank you very much for your attention!

- For more information visit: www.ccimi.maths.cam.ac.uk

- A. Iserles, C.-B. Schönlieb, Mathematics of Information - The Second Industrial Revolution, Mathematics Today, IMA@50 special issue, Vol. 50, No. 1, pp. 53-58, February 2013.