



Nils P. Basse, UPB International Seminar in Electronics Engineering, May 2009

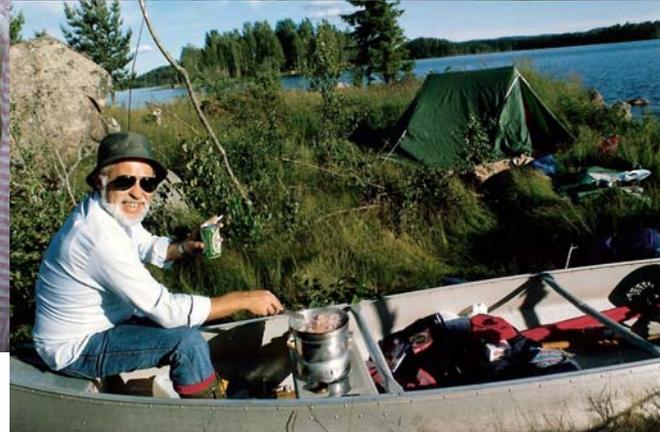
How nature works what physics can lead to

Curriculum vitae

- 2009-today: Principal Scientist at ABB Switzerland Ltd.
- 2006-2008: Scientist at ABB Switzerland Ltd.
- 2002-2005: Postdoc at MIT, USA
- 1999-2002: Ph.D. in physics (two years in Germany)
- 1996-1998: M.Sc. in physics (one year in England)
- 1993-1996: B.Sc. in physics
- 1990-1993: High School
- 1984-1990: Elementary and middle school
- 1981-1984: International School of Tanganyika
- Born 1974 in Denmark

Early influences – my family

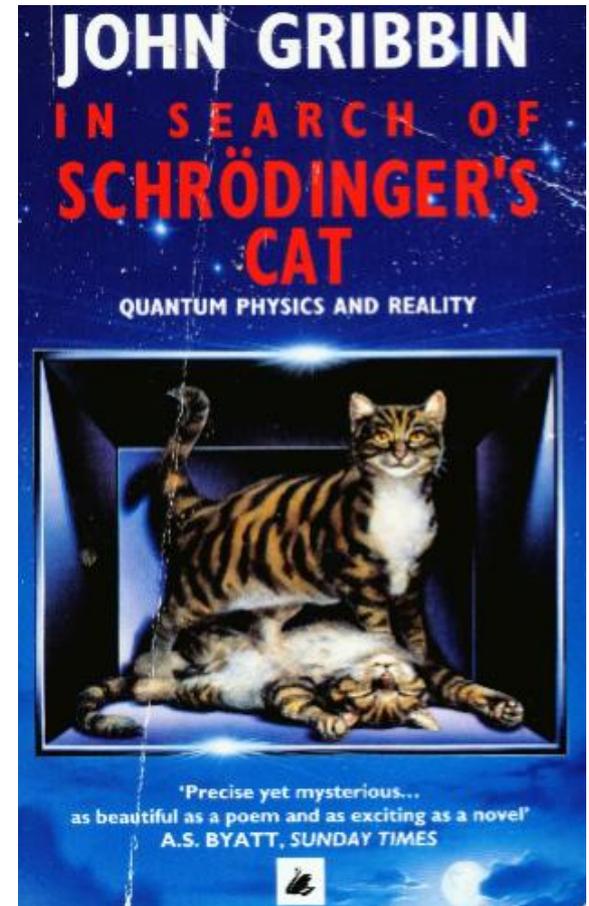
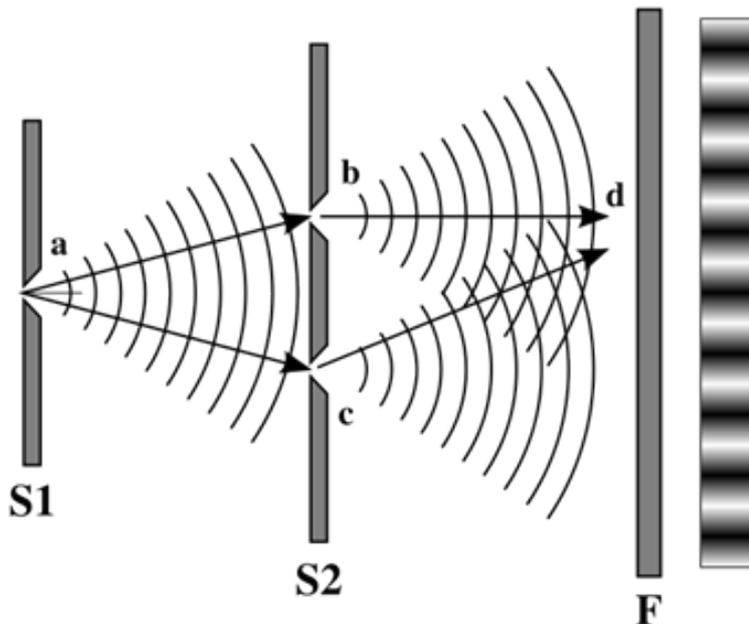
- Mom – teacher
- Dad – engineer with a business degree
- Brother – mechanical engineer, automation



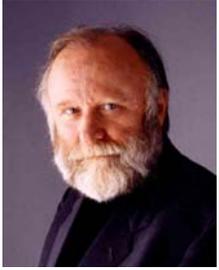
Early influences – science books



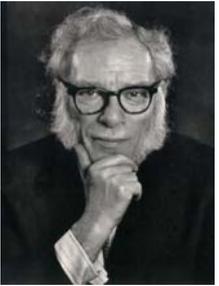
- John Gribbin: „In Search of Schrödinger’s Cat“ (1984)
 - Young’s double-slit experiment
 - The strange behaviour of light



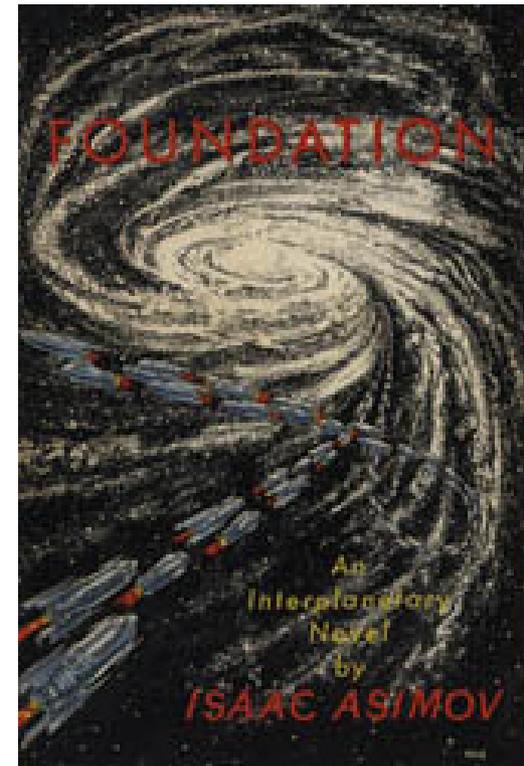
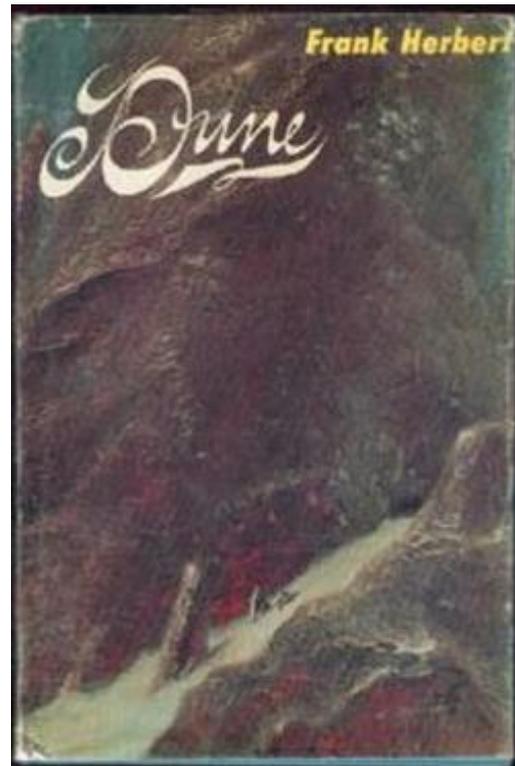
Early influences – science fiction books



- Frank Herbert: „Dune“ (1965)
 - Ecological fugue



- Isaac Asimov: „Foundation“ (1951)
 - The Roman Empire



High school

- Per Holm: My high school physics teacher
 - Wrote physics books for high school students
 - Gave me private lessons to prepare for an exam



University studies

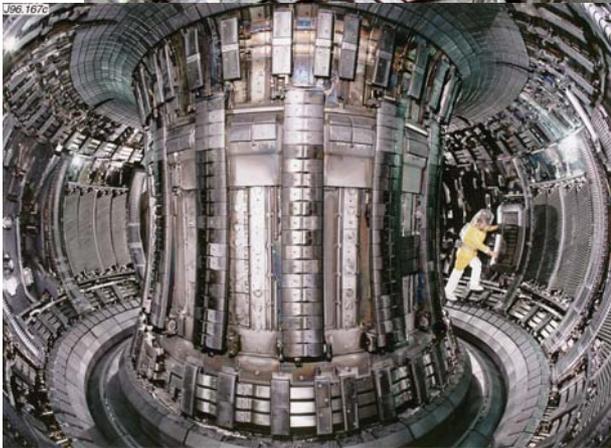
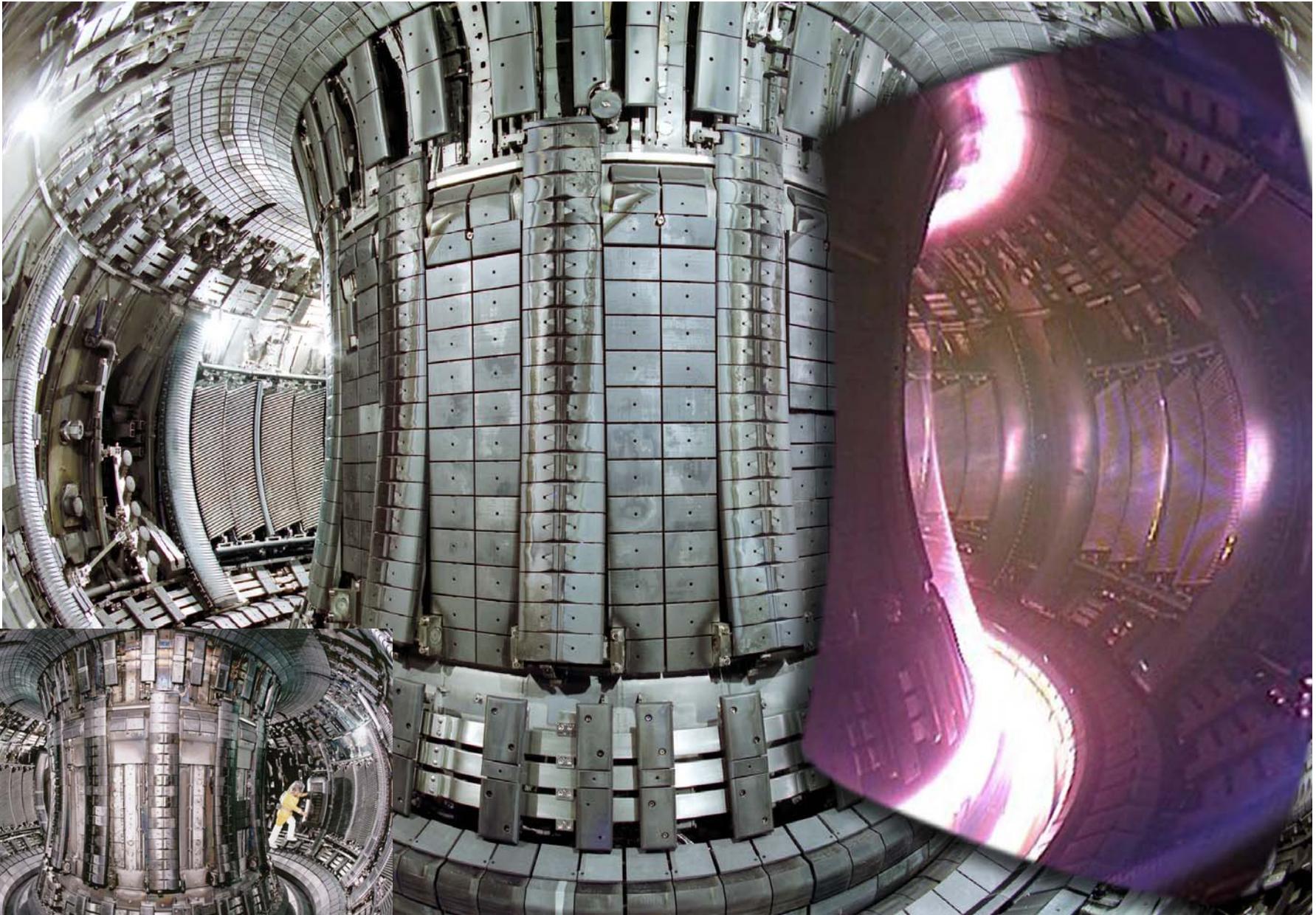
- I studied physics at the Niels Bohr Institute, University of Copenhagen, Denmark
- First year kamikaze course:
 - Physics
 - Mathematics
 - Failed first attempt, both 1st and 2nd year
 - Computer Science



How I found my research topic

- From a popular science book I became interested in energy released by nuclear fusion reactions
- Nuclear fusion takes place in plasmas:
 - Hot, ionized gases
- I took the only plasma physics course available at the Niels Bohr Institute
- I wanted to learn more about fusion and plasma physics, so I took a course at the Technical University of Denmark
 - The teacher had application forms for 6 months of study at the Joint European Torus (JET) tokamak in England
 - I went there and extended my stay to 1 year total

The Joint European Torus (JET) tokamak



First research experience

- Fusion appealed to me for several reasons:
 - The fuel - water and Lithium - is practically limitless
 - No CO₂ emission
 - No meltdown
 - No radioactive waste



- Masters thesis supervisor:
 - Klaus-Dieter Zastrow (Germany)



Learning the trade

- Fusion is a mix between basic and applied research
- It is a truly international effort
- Doctoral thesis supervisors:
 - Mark Saffman (US)
 - Sandor Zoletnik (Hungary)



Optical turbulence measurements

- Masters studies: Modelling measurements
- Doctoral studies: Making measurements

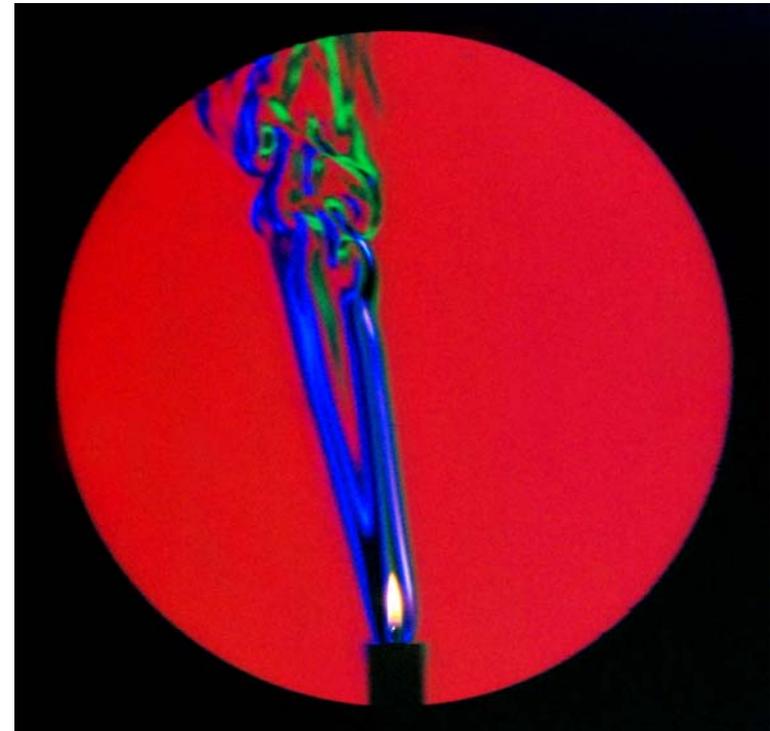


Turbulence



„Most flows occurring in nature and in engineering applications are turbulent.“

- H.Tennekes and J.L.Lumley



Postdoctoral Associate at MIT

- Applied on the web, had phone interview
- I always wanted to live in the US, I was fortunate to get the chance to work at MIT
- Research focus remained turbulence in fusion plasmas



Scientist at ABB

- After some years as a postdoc in the US, I felt a change was needed
- Applied on the web, had phone interview, visited 1 day for a formal interview
- Changes from academia to industry:
 - Learn about electrical engineering
 - Secrecy
 - Higher salary
 - More applied research
 - Funding restrictions



My view on physics

- As a part of the natural sciences, physics is all about understanding how nature works

„I do not know what I may appear to the world, but to myself I seem to have been only like a boy playing on the sea-shore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me.“

- Isaac Newton

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