

# Running an International Project

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## a view from the trenches

**Philip Burrows**

*John Adams Institute*

*Oxford University*

# You meet someone who

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- **Satisfy investors to secure ongoing funding**

# Who have you met?

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A)



**Technical Director  
of a thriving SME**

# Who have you met?

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**A)**



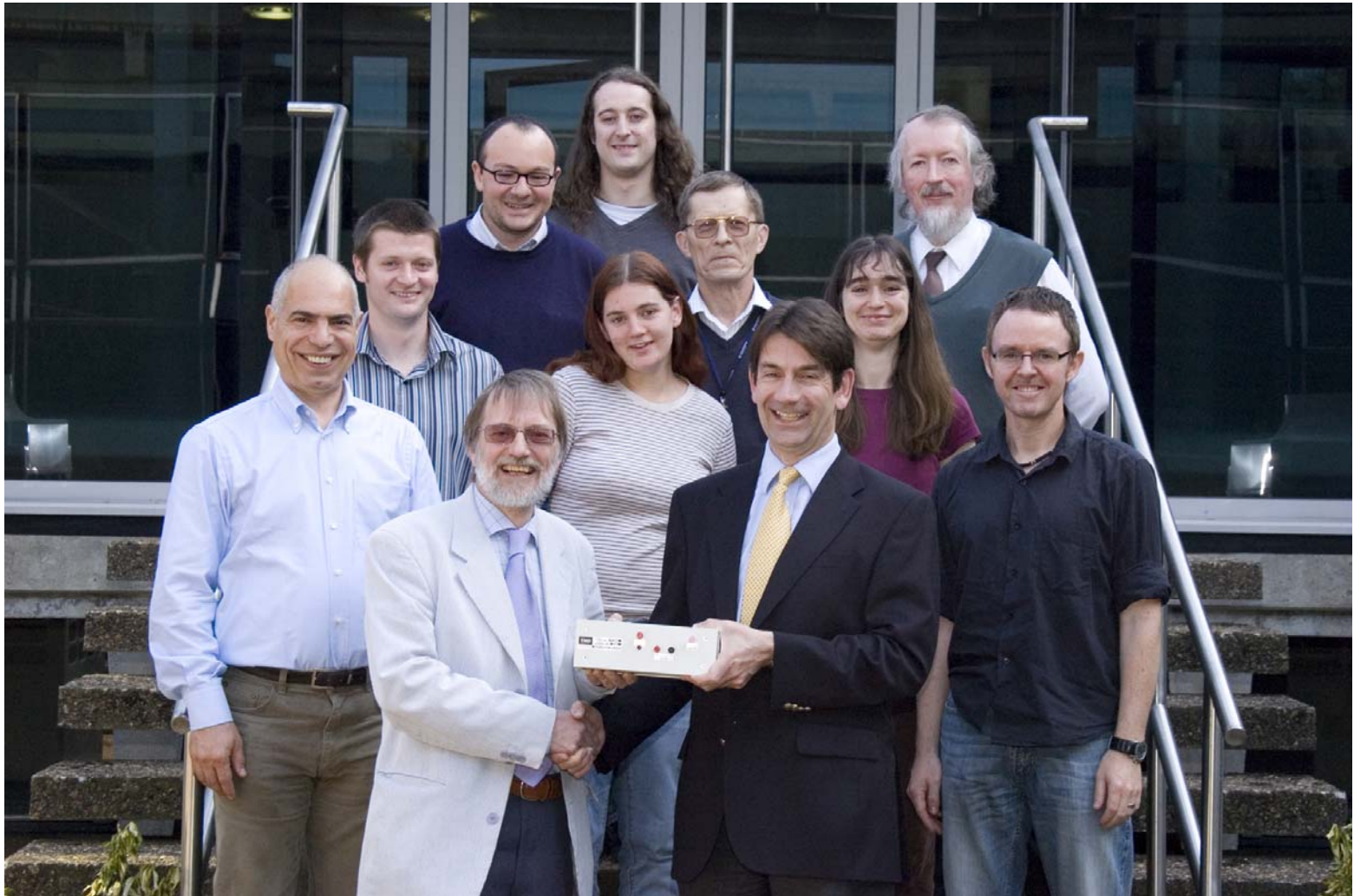
**Technical Director  
of a thriving SME**

**B)**



**Professor of Accelerator Physics  
Oxford University**

# Possibly both



# Who have you met?

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**B)**



**Philip Burrows**

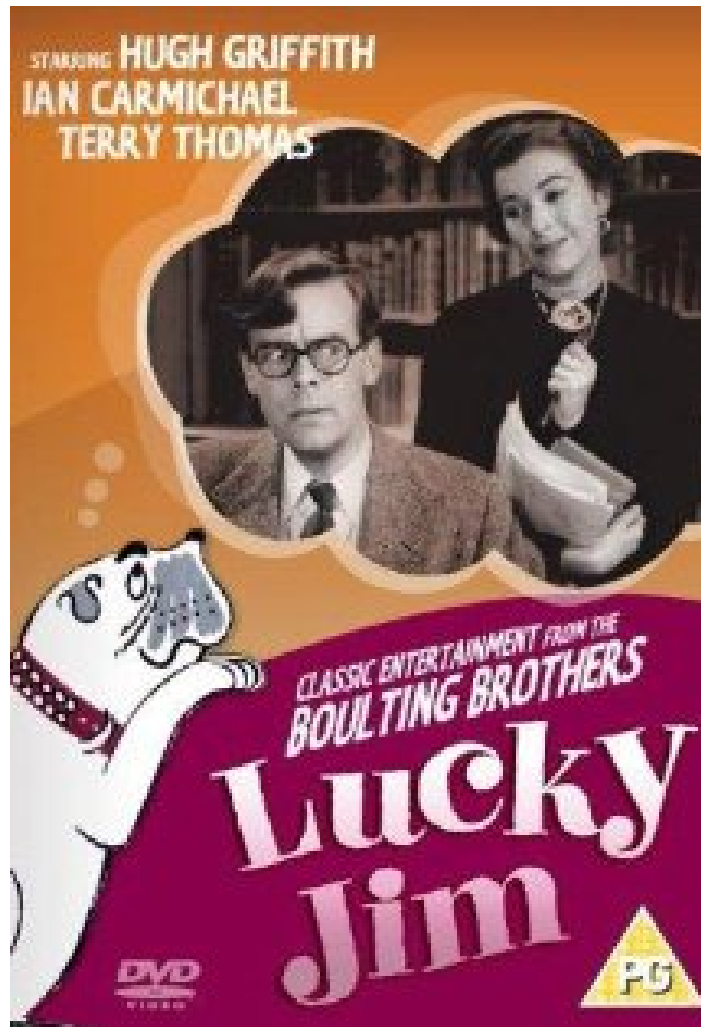
**Professor of Accelerator Physics  
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# It's all true!

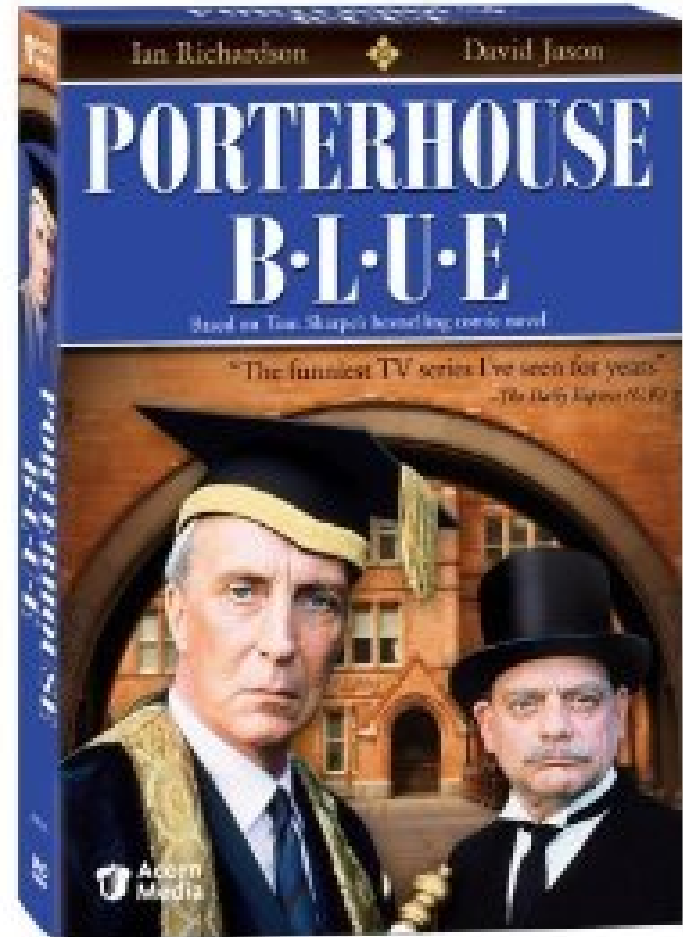
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# Typical academics?



Philip Burrows



# More typical!

**Philip Burrows**  
**Glenn Christian**  
**Hamid Dabiri Khah**  
**Javier Resta Lopez**  
**Colin Perry**

**Graduate students:**  
**Christina Swinson**  
**Ben Constance**  
**Robert Apsimon**  
**Douglas Bett**  
**Alexander Gerbershagen**  
**Michael Davis**

*Philip Burrows*



# Market sector

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- **Instrumentation and control of particle beams**
- **Feedback systems and related beam diagnostics**
- **Bunched beams, of spill length as short as 100ns, at pulsed beamlines**

**‘Feedback On Nanosecond Timescales’**

**(FONT)**

# Customers

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**Facilities with 'single-pass' beamlines:**

- **electron-positron colliders**

**International Linear Collider (ILC)**

**Compact Linear Collider (CLIC)**

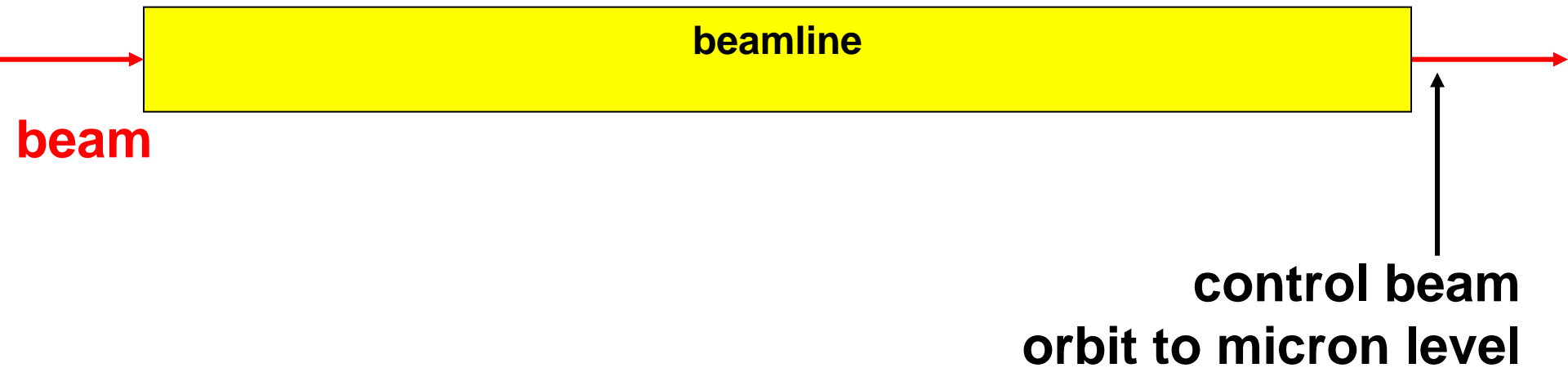
- **free-electron laser X-ray sources**

**UK New Light Source (NLS)**

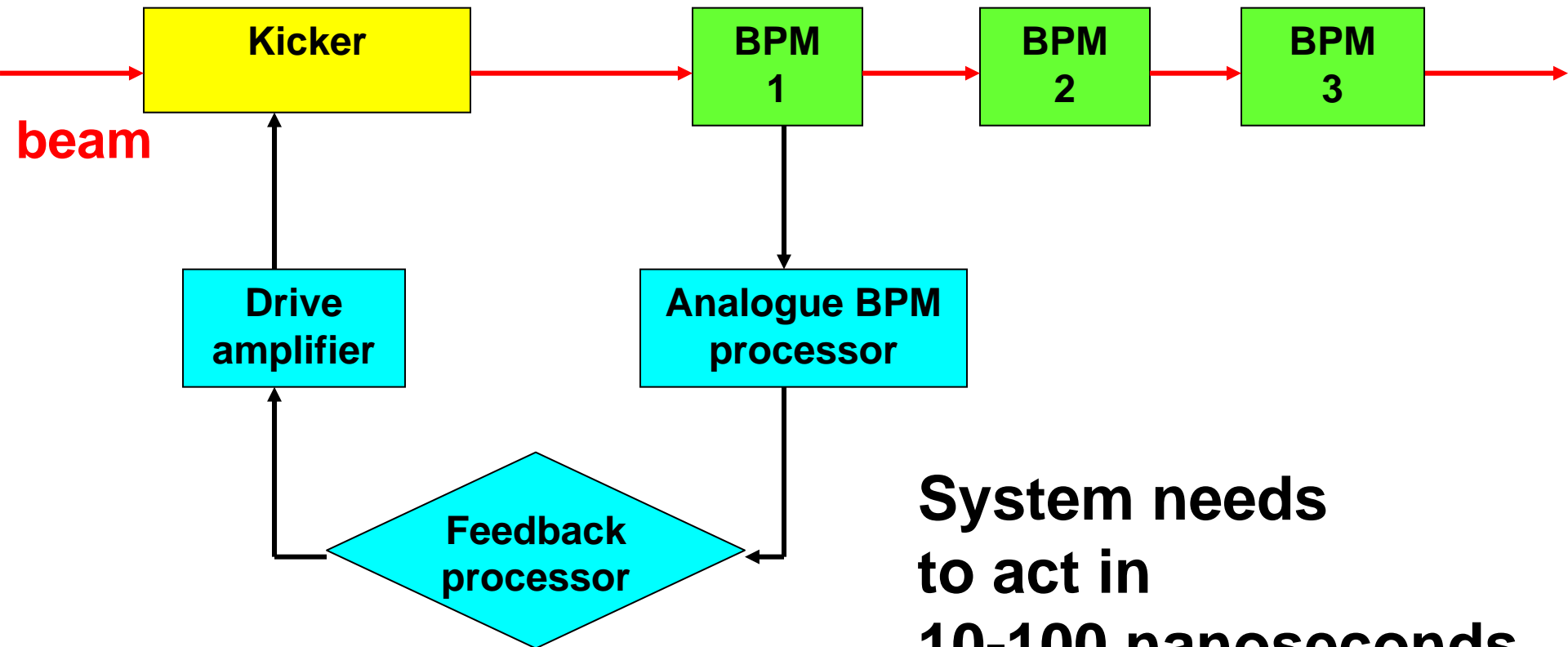
**Orbit monitor/control in storage rings**

# Typical job specification

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# Typical solution



**System needs  
to act in  
10-100 nanoseconds**

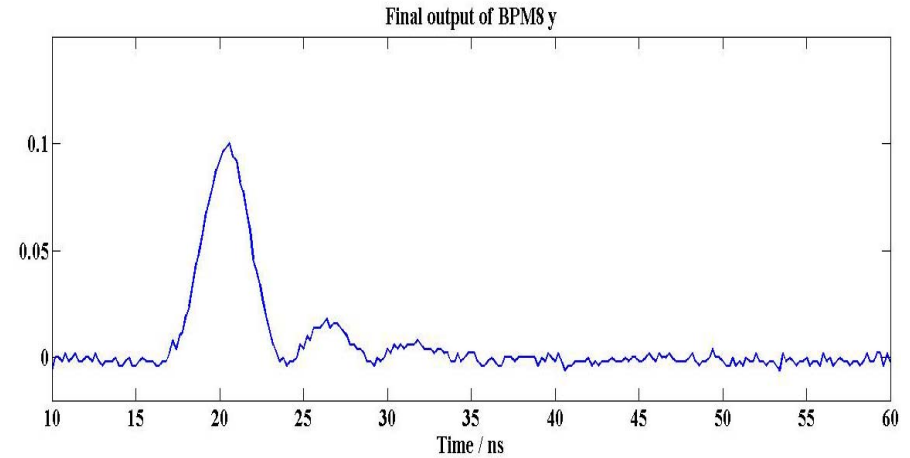
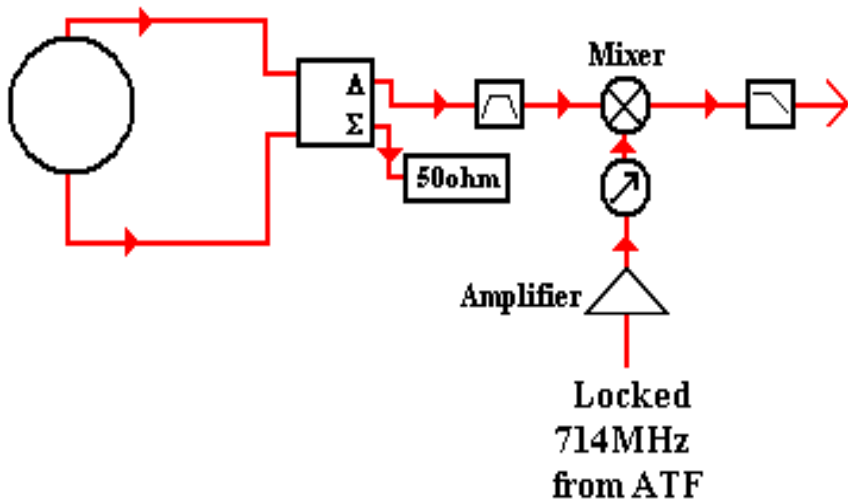
# Capabilities

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**Design and build fast radio-frequency devices**

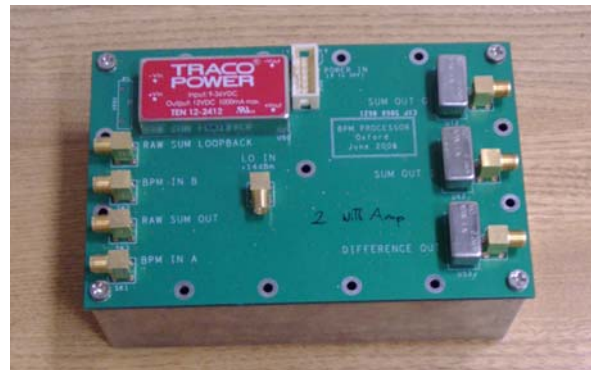
- **Signal processors (analogue)**

# Fast analogue signal processors



2005

Philip Burrows



2006

22



2007

JAI ATEC 6/10/10

# Capabilities

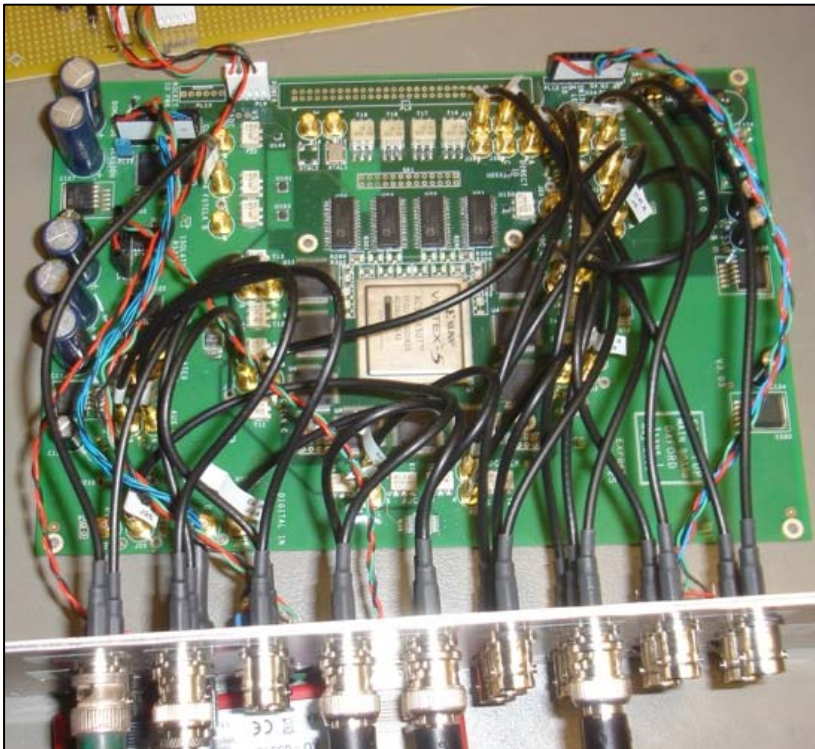
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**Design and build fast radio-frequency devices**

- **Signal processors (analogue)**
- **Feedback processors (analogue + digital)**

# Feedback processors

## FONT5 (2009)



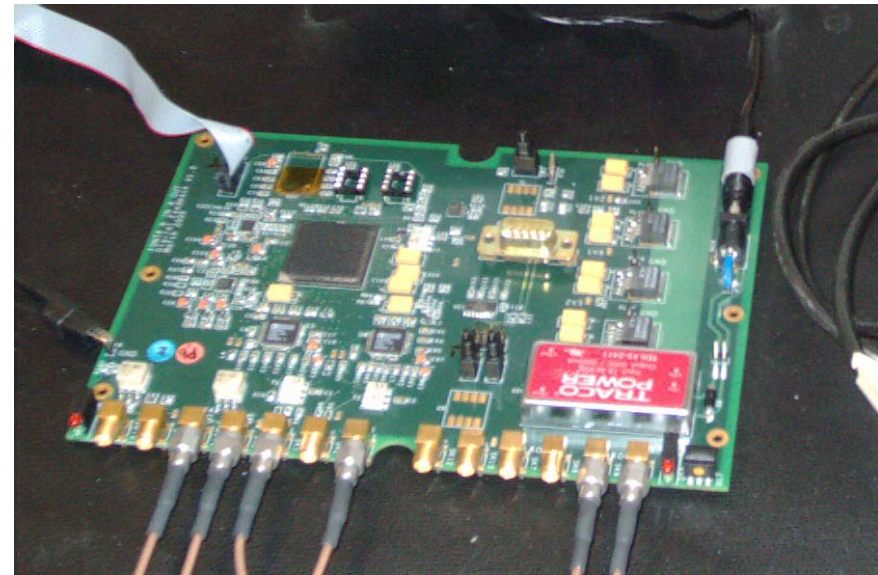
Xilinx Virtex5 FPGA

9 ADC input channels  
(TI ADS5474)

4 DAC output channels  
(AD9744)

Clocked at 357 MHz  
phase-locked to beam

## FONT4 (2007)



# Capabilities

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**Design and build fast radio-frequency devices**

- **Signal processors (analogue)**
- **Feedback processors (analogue + digital)**
- **High-power amplifiers (tube and solid state)**

# Fast drive amplifiers

**FONT1 (2000)**



**FONT3 (2005)**



**FONT4 (2007)  
(TMD)**



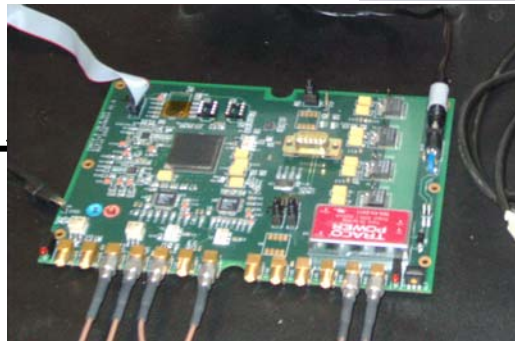
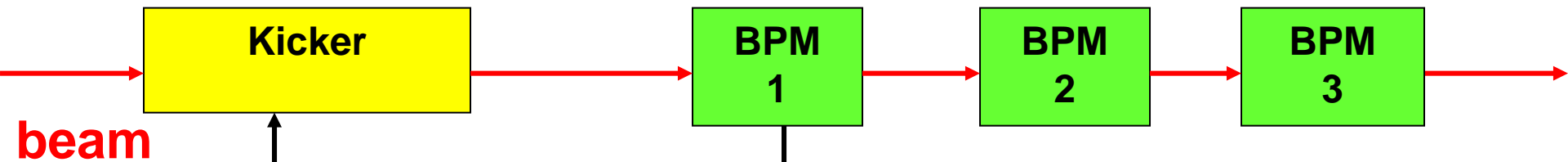
# Capabilities

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**Design and build fast radio-frequency devices**

- **Signal processors (analogue)**
  - **Feedback processors (analogue + digital)**
  - **High-power amplifiers (tube and solid state)**
- Deliver complete systems to overseas laboratories**

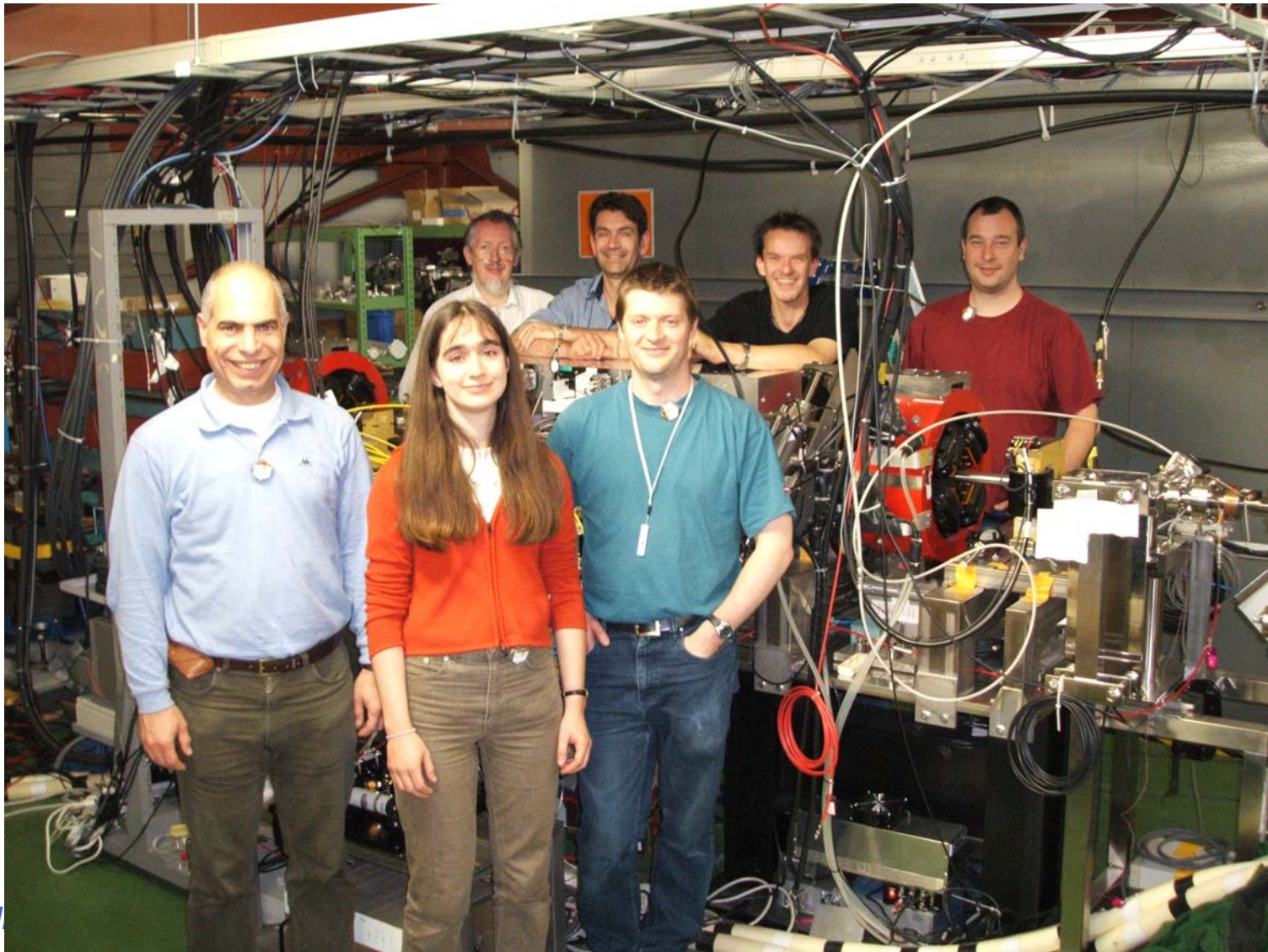
# Complete system



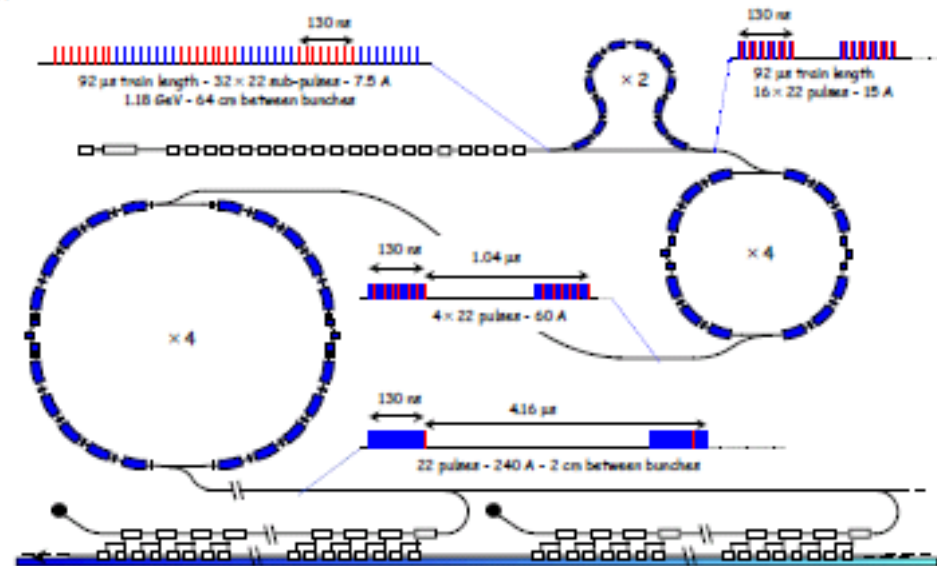
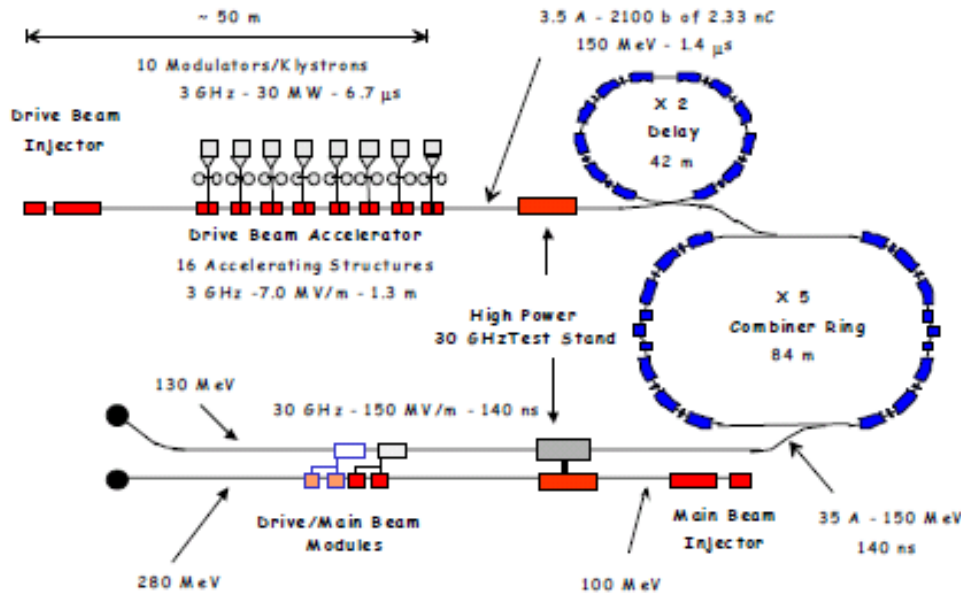
# NLCTA (SLAC)



# ATF (KEK)



# CTF3 (CERN)



# Partners

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- **STFC Accelerator Science & Technology Centre**
- **CERN (Geneva)**
- **DESY (Hamburg)**
- **KEK (Japan)**
- **SLAC (USA)**
- **TMD Technologies Ltd**

# Operating internationally

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- **Negotiate our role + contributions to projects**

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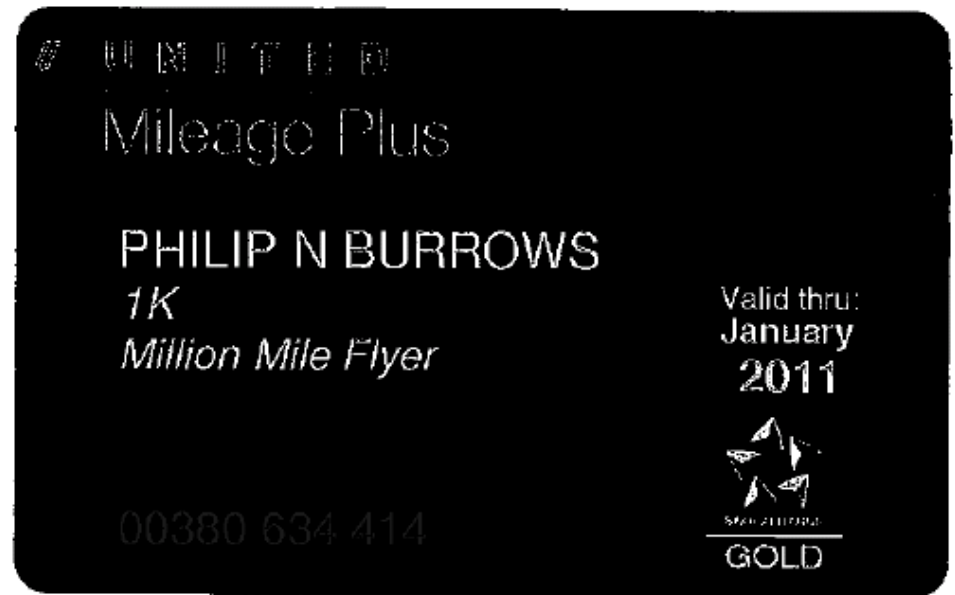
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- **Commission, maintain + operate systems in situ**

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- **Obtain funding (UK, EU, partners ... )**
- **Design + build hardware according to schedule**
- **Deliver equipment + people to Japan, USA ...**
- **Commission, maintain + operate systems in situ**
- **Deal with contingencies**

# The life of a professor



# Skills + capabilities (1)

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- **Advanced simulations:**  
**beam dynamics, electronics, feedback ...**

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# Skills + capabilities (1)

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- **Advanced simulations:**
  - beam dynamics, electronics, feedback ...**
- **Fabrication of state-of-the-art instrumentation + control systems**
- **Software, firmware + DAQ systems**
- **Data analysis, presentation + reporting of results to stakeholders**

# Skills + capabilities (2)

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- **Negotiating, leading and participating in complex projects involving distributed international partners**

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- **Logistics of sending people + hardware abroad**

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# Skills + capabilities (2)

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- **Negotiating, leading and participating in complex projects involving distributed international partners**
- **Logistics of sending people + hardware abroad**
- **Supporting teams remotely**
- **Communications across disparate timezones**
- **Training people and team building**

# Graduates from FONT group

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- **Gavin Nesom:** Riverbed Technology, California
- **Simon Jolly:** Imperial College + RAL
- **Steve Molloy:** SLAC → RHUL
- **Christine Clarke:** Oxford Particle Physics
- **Christina Swinson:** Brookhaven National Lab.
- **Glenn Christian:** Atomki Debrecen → JAI
- **Glen White:** SLAC
- **Tony Hartin:** DESY

# Thanks for your attention!

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## Questions?