



# Application for Continued LSC Membership

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Cardiff University



# Plan of the talk

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- Current make up and focus of the group
- What we're planning to do in the LSC
  - Fairhurst - inspiral searches
  - Sutton - burst searches
- Expected teaching obligations
- Funding



# Cardiff School of Physics and Astronomy

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- Majority of faculty in astronomy.
  - observation, instrumentation, & gravity
- Astronomy group has recently greatly expanded
  - Two professorial staff (Fairhurst and Sutton) and three junior staff in 2007 alone.
- Astronomy programme is supported by three rolling grants
  - Astronomy Instrumentation, Observational & Theoretical Astrophysics, Gravitational Physics.
- Involved in Herschel, Clover, SCUBA, Quad, Planck, SKA, ...
  - Of particular interest to Gravitational Physics Group are Clover, Planck and SKA (we have a common STFC PDRA on SKA)



# Gravitational Physics Group

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## 4.2 Permanent Staff ...

Leonid Grishchuk

Joe Romano (till October 07)

Bernard Schutz (20%)

Bangalore Sathyaprakash

Stephen Fairhurst (RS URF)

Patrick Sutton

## 4 PDRAs ...

Thomas Cokelaer

Alex Dietz (partly funded by EGO)

Anand Sengupta (till 08/07)

Chris Van Den Broeck

+ 1 to be hired (from 09/07)

## 7 PhD Students ...

Ian Harry (from 09/07)

Gareth Jones

David McKechnan

Devanka Pathak

Craig Robinson

Edmund Schluessel

Rhiannon Williams

Jack Yu

## ... and a System Admin.

Gerald Davies (partly  
funded by GridOneD)

*names in blue: LSC members*



# Research Interests of the Group

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- Sources of gravitational waves
  - Relic GW background
  - Late-time dynamics of binary black holes (BBH)
  - Relativistic instabilities in neutron stars (NS)
  - GW spectrum of precessing NS
  - Strong-field tests of gravity
- Data analysis algorithms
  - Matched filtering and time-frequency transforms
  - Template banks
  - Coherent and coincidence analysis
  - Astrophysical interpretation and upper limits on event rates
  - Interferometer response

## Gravitational wave data analysis

Binary neutron stars  
Non-spinning and spinning BBH  
Stochastic GW background  
Gravitational wave bursts  
Coincidence with gamma-ray bursts and supernovae

## Future ground-based detectors and LISA

Science case for LISA, 2<sup>nd</sup> and 3<sup>rd</sup> generation detectors (advanced LIGO/VIRGO, Einstein GW Telescope)  
LISA mock data challenge  
Involvement in ILIAS and design study proposal



# LSC Contributions: Fairhurst

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- Active member of CBC (inspiral) group (2003+)
  - Participated in design and implementation of end-to-end inspiral search pipeline
  - Led search of S3 data for binary neutron stars.
  - Led joint inspiral analyses with TAMA and Virgo
  - Responsible for generating inspiral hardware injections
- Member of calibration review team.
- Member of detection committee.



# Research Program: Fairhurst

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- Astrophysical interpretation of inspiral searches
- Coherent search for inspiral-merger-ringdown signals using numerical relativity waveforms
  - co-lead with Laura Cadonati
- Work to automate inspiral search pipeline for fast turnaround of analysis
- Continue effort of the Cardiff group to incorporate spin effects in inspiral searches
  - Will work closely with ~3 Cardiff PDRAs on inspiral analysis.
  - Has a graduate student starting in September.



# LSC Contributions: Sutton

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- DMT (2001-2004)
  - SenseMonitor, RayleighMonitor, DMT class for online calibrations
  
- Burst Searches (2001+)
  - Led LIGO-TAMA joint burst search
  - Coherent burst searches
    - Implemented coherent search algorithm for GW bursts, coherent veto test, applying to GRB searches
  - Burst review committee
  
- LSC Presentations & Publications committee.





# Research Program: Sutton

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- Coherent search for unknown gravitational wave bursts with a network of interferometers
  - Triggered searches for gamma-ray bursts, pulsar glitches, etc.
    - incl. pulsar glitch triggered search with Heng
  - All-sky coherent & hierarchical searches.
    - collaborations with Chatterji, Cannon, Searle
- Astrophysical interpretation of burst searches, upper limits and detection challenge
- Null stream in inspiral searches (with Fairhurst)
  - Will have 1 PDRA (TBD). Looking for graduate students.



# Funding & Teaching

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- Cardiff gravitational physics group is funded by a rolling grant from PPARC/STFC (Science and Technology Facilities Council)
  - Whole group covered by one grant.
  - Renewed every three years.
- Latest renewal proposal has been submitted.
  - Reviewed in May.
  - Strong positive feedback from review panel.
  - Expect results from application in September.
- Teaching duties:
  - Sutton: Senior lecturer. Will teach GR course in fall term in 07-08.
  - Fairhurst: Royal Society research fellow - minimal teaching duties.
    - Transitions to senior lecturer in 5 years.