5.3 Durham Team (DUR)

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Staff	Name	Degree	Status	%	Work Package
1.	Jeremy Allington-Smith	PhD	Lecturer	5	1.5, 1.6, 3.11
2.	Roger L. Davies	PhD	Professor	5	1.3, 1.5
3.	Jürgen Schmoll	Dipl.Phys.[1)]	post-doctoral	10	1.2, 2.1

[1)] PhD expected soon

Local team description :
The Astronomical Instrumentation Group of the University of Durham has long experience of building complete instruments for 4m telescopes and major sub-assemblies of 8m instruments (most recently for the two GEMINI multiobject spectrographs: GMOS). Recently we have specialised in the development of equipment for integral field spectroscopy (IFS). We have originated novel designs for IFS and maintain a major capability for the construction of fibre-based IFS devices including the testing of critical components. The IFS work is closely integrated with work on other aspects of spectroscopy, especially multi-object spectroscopy with fibres or slits and adaptive optics. We have a vigorous R&D effort in all these areas supported by a rolling grant from PPARC. The astronomical instrumentation group is closely integrated with the extragalactic astronomy group and, as such, plays a major role in leading the scientific exploitation of instruments and formulating plans for new instruments.

The 3D (IFS) instruments we have built include: SMIRFS-IFU (UKIRT), TEIFU (WHT; with our ELECTRA AO system now being upgraded for the UK's NAOMI AO System), GMOS-IFU (Gemini), GNIRS-IFU (Gemini) and IMACS-IFU (Magellan). The last three are under construction, with the GMOS-IFU due for on-telescope tests this August. In addition, we are working on design studies for GIRMOS (Gemini), FMOS (Subaru) and NGST-NIRMOS. GIRMOS and FMOS (optionally) have multiple-IFS systems and the NGST instrument may include a 3D capability.

We have strong links with LEI/LYO/ESO (SAURON) and LEI/LYO/MAR/MPE (NGST). We also have many extra-European links including GEMINI and the Anglo-Australian Observatory. We also have informal links with many UK groups (including CAM) on 3D data reduction software.

Major research fields include most areas of extragalactic astronomy. We are a member of the SAURON project which is producing many new results on elliptical galaxy dynamics and stellar populations. Other science results based on 3D include studies of black hole masses in elliptical galaxies and the distribution of IR line emission in active galaxies.

Significant recent publications :

Haynes, R., Lee, D., Allington-Smith, J., Content, R., Dodsworth, G., Lewis, I., Sharples, R., Turner, J., Webster, J., Done, C., Peletier, R., Parry, I. & Chapman, S. 1999, '*Multiple object and integral field near-infrared spectroscopy using fibers*', PASP 111, 1451

Allington-Smith, J. & Content, R. 1999 '*Sampling and background subtraction in fiber-lenslet integral field spectrograph*', PASP 110, 1216-1234.

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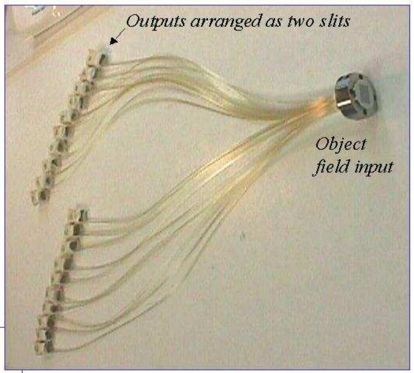
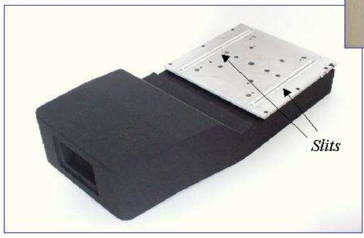
GEMINI Multiobject Spectrographs

GMOS Integral Field Unit

- 7x5 arcsec field with unit filling factor
- 0.2 arcsec sampling
- Extra field for background estimation
- Interchangeable with Multislit masks
- 1500 elements in total
- Commissioning August 2001



Complete object field fibre bundle containing 1000 fibres



Complete IFU module showing interface to spectrograph

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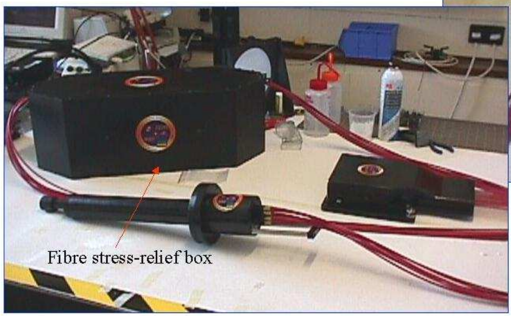
Thousand Element Integral Field Unit (TEIFU)

- Exploits image obtained with Adaptive Optics on the William Herschel Telescope
  - with ELECTRA: 0.25" sampling
  - with NAOMI: 0.17" sampling
- 2 equal-sized fields with variable separation
- Fibre-lenslet system



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SMIRFS

- Experimental near-infrared IFU used with CGS4 on UKIRT
- Uncooled *fibre-lenslet* system with optical relay onto spectrograph cold slit
- 6 x 4 arcsec field with 0.6 arcsec sampling (limited by CGS4 slit length)
- *SMIRFS* includes a multiobject mode (14 fibres)