

Technology for Experimental and Observational Physics in Scotland

TEOPS: Technology for Experimental and Observational Physics in Scotland

- Collaboration between ATC and Glasgow University Institute for Gravitational Research and Experimental Particle Physics groups
- Goal: To identify and exploit shared areas of technology involved in instruments used in these areas
- Has been running (successfully) for about a year
- Two TEOPS Advanced fellows

Examples of commonality

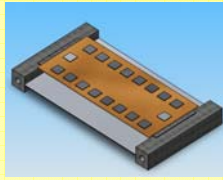
- Cryogenics
 - Astronomical instruments have been operating at cryogenic temperatures for decades (as low as 4 K and even below 100 mK)
 - Cryogenic operation is now of interest for future generations of both gravitational wave detectors and colliders for particle physics



- New materials
 - e.g. silicon carbide and carbon/silicon carbide are being looked at for use in astronomical instruments, gravitational wave detectors and high energy physics detectors



Si-C lightweighted telescope mirror (courtesy M. Krodell)



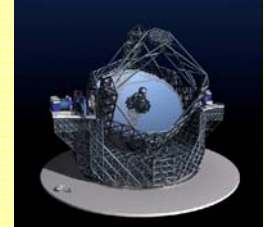
ATLAS detector support

- Equipment
 - Glasgow: optical characterisation suite, precision assembly
 - ATC: clean rooms, flexure rigs, large equipment handling, optics labs



Examples of current work

- STFC grant proposal on ELT passive & adaptive mirror technologies
 - perform hydroxide catalysis bonding trials on selected Silicon Carbide materials
 - Bonding tests on actuator interfaces

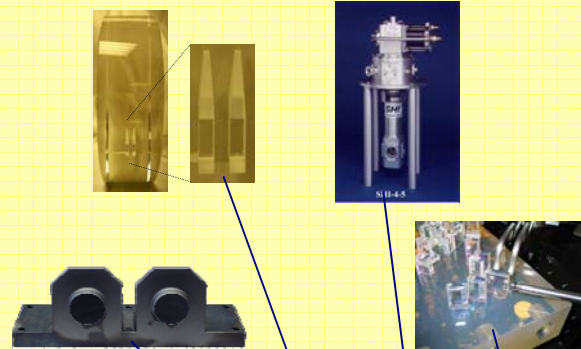


- TEOPS material property test bed located at UK ATC (Edinburgh)

- Make measurements from 300 mK to 300 K
- Sample size up to 40 cm high, 20 cm diameter
- Optical access (four windows)
- Mechanically cooled – no cryogens required
- Measurements include:
 - Thermal conductivity, Heat capacity, Thermal expansion,
 - what do you want....?

What have we done?

- Identified 4 key areas of interest (see below)
- Found areas where
 - technology from one group can be applied to other areas
 - equipment in one group enhances capabilities of other areas
 - made links outside TEOPS (e.g. Glasgow Engineering)
- Joint activities already underway & more are planned



	Contracts in discussion Proposals submitted PIPSS under discussion Possible future WORK	Alt. materials inc. SiC & C/SiC	Optical & Mechanical Systems	Cryogenic Facility	Precision Placement
ATLAS Upgrade		■		+	+
UK ATC IGR PPE Industry					
EGO			■		
UK ATC IGR					
GEO 600 (HF)			●		
UK ATC? IGR					
Enhanced & Advanced LIGO		+	●		●
UK ATC IGR Industry					
LISA, GAUGE		+	+		+
UK ATC IGR PPE					
Future GW Detectors		+	+	+	+
UK ATC IGR PPE					
European ELT		■	+	+	+
UK ATC IGR PPE Industry					
IR & submm astronomy		+	+	+	+
UK ATC IGR PPE Industry					
PIPSS		▲	▲		
UK ATC IGR PPE Industry					