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Projects for inclusion in a \$10M Investment Plan for astronomy infrastructure

On 9th November 2009, Astronomy Australia Ltd (AAL) called for Expressions of Interest (EoI) to assist it in the development of a \$10M Investment Plan for EIF-funded astronomy infrastructure. When submissions closed on the 10th December 2009, AAL had received 18 EoIs with a total funding request four-and-a-half times more than the funds available. On 14th December 2009 the AAL Board met to review all 18 EoIs, with consideration given to strategic significance, project maturity, alignment with the current Australian astronomy Decadal Plan, and scientific return for the proposed investment.

The EoIs listed below have been selected for consideration as part of a \$10.2M Investment Plan. AAL has discussed these EoIs with the Department of Innovation, Industry, Science and Research, and understands that they are all eligible to be funded from AAL's \$10M EIF grant.

AAL will work with the PIs and relevant institutions during late-January and February 2010 to progress these EoIs to the project plan stage.

Murchison Widefield Array (\$3,070,000)

Proposal submitted by Steven Tingay

The Murchison Widefield Array (MWA) is a low frequency wide field-of-view interferometer located at the Murchison Radioastronomy Observatory. The project has been underway since 2005 as an international collaboration between partners in Australia, India and the USA. EIF funds have been requested to augment NCRIS funds allocated to the project and funds to be requested from the US National Science Foundation to complete the proposed 512 antenna array.

HERMES 4th channel (\$1,670,000)

Proposal submitted by Matthew Colless

The HERMES (High Efficiency and Resolution Multi-Element Spectrograph) is currently under development at the AAO. HERMES will allow the simultaneous spectroscopic observation of nearly 400 targets at a spectral resolving power of about 30,000, over 3 separate wavelength regions. EIF funding has been requested for a 4th near-infrared channel to increase the wavelength coverage and allow all the major objectives of the Galactic Archaeology survey to be pursued.

AAOmega detectors upgrade (\$710,000)

Proposal submitted by Matthew Colless

A proposal was submitted to AAL to upgrade the existing AAOmega spectrograph with new CCDs. A new blue CCD from E2V will significantly increase efficiency at near-UV wavelengths (370 - 400 nm), critical to many stellar observing programs, and remove the cosmetic flaws that currently limit such investigations. A new red CCD from LBNL will increase the quantum efficiency in the Z and Y bands (800-1100 nm) by factors of 2 - 3, enabling a whole new class of science projects to be undertaken. AAL is not able to fund the full cost of this proposal and will work with the AAO to determine if the detectors can be upgraded with the \$710,000 of available EIF funding.

C/X upgrade to the Australia Telescope Compact Array (\$1,471,000)

Proposal submitted by Lewis Ball

This project proposes to increase the maximum accessible instantaneous bandwidth of the 6cm and 3cm receivers of the ATCA to take advantage of the increased correlator capacity made available by the recently completed Compact Array Broadband Backend upgrade. The project will merge the 6 and 3 cm bands from the current (4.4-6.9 GHz & 8.0-9.2 GHz) bands to provide continuous coverage of approximately 4-12 GHz.

GPU Supercomputer for Theoretical Astrophysics Research (\$1,040,000)

Proposal submitted by Stuart Wyithe

The project proposes to construct a next generation GPU-based computing cluster for computational astrophysics, that will be hosted by the Swinburne Center for Astrophysics and Supercomputing. The cluster is expected to achieve ~600 Teraflop performance, with 200 Terabytes of storage, to tackle next-generation computational problems not possible with existing CPU-only architectures.

Site qualification and exploratory science from Antarctica (\$1,330,000)

Proposal submitted by John Storey

The aim of this project is to build three robotic astronomical observatories, in collaboration with China, Japan and the US, for deployment on the Antarctic plateau at Dome A, Dome F and Ridge A, and to collaborate with these countries in pathfinder facilities at optical and THz wavelengths. \$330,000 of this proposal is expected to be funded by the NCRIS grant.

Upgrade of GMOS-S CCDs to modern E2V parts (\$690,000)

Proposal submitted by Brian Schmidt

The CCDs in the GMOS-S instrument on the 8m Gemini South telescope, are nearly a decade old, and suffer from several defects relative to new generation detectors, including poor quantum efficiency and severe fringing beyond 750nm, and subtle cosmetic defects that make nod-and-shuffle observations difficult over large fields-of-view. The project proposes to replace these with modern E2V devices that have identical footprints, and exceed their performance at all wavelengths.

Replacement cloud monitoring infrastructure, Pierre Auger Observatory (\$50,840)

Proposal submitted by Roger Clay

The Pierre Auger Observatory is investigating the origin of the highest energy cosmic rays with a detector array covering 3000 square kilometres in western Argentina. As a partner in this international facility, one of Australia's responsibilities has been to provide and maintain the infrastructure required to monitor the night-time cloud conditions over the Observatory. This proposal aims to provide replacement cloud monitoring equipment for the Observatory in the form of infra-red cloud detectors using single-pixel infrared radiometers.

AAL management fee (\$500,000)

As with the astronomy NCRIS grant, AAL will require a management fee to fund the costs of overseeing the above portfolio of projects. AAL's NCRIS management fee for 2010/11 will be \$255,886. AAL will seek to negotiate a similar amount for each year of this EIF grant (2011/12 and 2012/13).