

Special Session 1

Large astronomical facilities of the next decade

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Preface

The questions addressed in this large and popular meeting were: What mature proposals for the new large astronomical facilities of the next decade are available? When can they be funded? What international planning is underway?

It is understood that astronomy requires major facilities across and beyond the electromagnetic spectrum. It is agreed those built should be innovative, and where possible complementary, to generate a scientific optimum. Some complementary pairs of facilities generate enormous synergy – *HST* imaging with spectra from the large ground telescopes being a good example.

Very many excellent proposals are available. Funding and approving these projects in the chronological order of their origin is not obviously ideal: some sort of a rank is needed. This raises the primary question of interest: what is the ‘best’ way to set a priority order to spend the available finite funding in a global context? This decision and funding process must take place in a context in which the global astronomy community is building mid-price (US\$10M to US\$100M) new facilities at a rate higher than one per year, all of which require operations and upgrade support well into the future. Cumulative operations costs compete for funding with new capital costs.

The list of facilities which are in operation, under development, or proposed for near-term development which was outlined at the discussion includes the following:

UHE: ICE-CUBE, Amanda, Baikal, Fiona, km3Net, Super-K, ...

VHE: FlysEye, Auger, Hegra, Magic, HESS, Tel-Array, Magic-2, 5X5 ...

HE: *Integral*, *Batse*, *Swift*, *XTE*, *Chandra*, *XMM-Newton*, *Suzaku*, *FUSE*, *Con-X*, *HXMT*, *Spec-X*, *XEUS*, ...

mid-IR: *Herschel*, *Spitzer*, *Akari*, *Sofia*, *SPICA*, ...

mm-wave: Carma, MMA, GMT, CC-LMT, ALMA, ...

cm-, m-wave: LOFAR, Allen, KAT, MWA, Madrid, Sardinia, GBT, E-VLA, e-Merlin, FAST, GMRT, VSOP-2, X-NTD, SKA, ...

optical-IR: Keck-I,II, Gemini-N,S, VLT ($\times 4$), Magellan ($\times 2$), SALT, HET, LBT, Subaru, Lamost, LSST, JELT, CFGT, GMT, E-ELT, TMT, ...

planetary missions: *CoRot*, *Kepler*, *Gaia*, *Darwin*, *TPF*, (*SIM*), ...

virtual observatories: AVO, JVO, CVO, ..., IVOA

This list is certainly incomplete. Each of these requires construction funds, together with operation and upgrade costs which typically exceed the capital construction cost by a factor of two over an operational lifetime.

No simple solution was forthcoming. An interesting future awaits.