



H.E.S.S. Experiment

<http://www.mpi-hd.mpg.de/hfm/HESS/>

Location and lease agreement

- Farm Goellschau, Khomas Highland, Namibia
- Air and sea transport routes close by
- Farm owner, and surrounding farms, provide guest house facilities for visiting scientists and contractors
- Lease agreement
 - Farm owner has committed to provide:
 - Ample surface area for construction and operation of up to 16 telescopes
 - Constant water supply for astronomers and contractors
 - Farmer benefits financially from lease
 - Provision of suitable protection for HESS (II) in case of transfer of ownership of farm, or any legal issues that may arise
 - Contract for 10 years, renewable for a further 10 years in 5 year options



Site of the HESS telescope (blue marker). Major air and sea transport routes (Windhoek and Walvis Bay respectively) are indicated by red markers.

Governance: formalisation

- Organisational structure and working groups defined by legally non-binding Memorandum of Understanding (MoU)
- MoU remains effective for at least 5 years of HESS operations
- A more formal document is being prepared for HESS II
- The Max Planck Society, represented by the Max Planck Institute for Nuclear Physics, acts as both host institution and participating institute

Governance: boards and committees

- Collaboration board
 - Composition
 - Representative from each partner institution, with weighted voting right
 - Spokesperson, deputy spokesperson and technical coordinator as ex-officio members, without voting right
 - Weighting takes into account integrated financial, manpower and in-kind contribution
- Observation committee
 - Composition
 - Heads of all Science Working Groups
- Finance committee
 - Composition
 - Representatives from each funding agency
 - HESS collaboration management

Governance: groups and personnel

- Management (elected by Collaboration Board)
 - Spokesperson
 - Deputy spokesperson
 - Technical co-ordinate
- Technical Task Groups
 - Site
 - Safety
 - Mount and dish
 - Mirrors
 - Camera
 - Central trigger
 - DAQ, software, telecommunications
 - Atmospheric and telescope monitoring
 - Optical monitoring telescope
 - ROTSE
- Physics Working Groups
 - Multi-wavelength observations
 - Pulsars, pulsar winds, plerions, SNR
 - X-Ray binaries, Micro-quasars
 - Surveys, galactic disc, galactic centre, GMC's
 - Extended extra-galactic objects
 - Active galactic nuclei, radio galaxies, gamma-ray bursts
 - Astrophysical particles, exotic phenomena
- Shift co-ordination

Policies: Intellectual Property Rights

- Acquired knowledge and expertise (developed within experiment context)
 - Entitled for use by all partner institutes
 - May only be used within context of experiment
- Results (obtained in connection with work on experiment)
 - To be made accessible to all partner institutes, without cost
 - May only be used within the context of the experiment
- Patentable inventions or profitable techniques (developed within experiment context)
 - Collaboration to be informed in order to decide on appropriate ownership

Role of local community

- Government
 - Exchange of Notes between Namibia and Germany
 - Guarantees access to site
 - Guarantees preferential treatment on the import and export of scientific instrumentation
 - Exempts any material or equipment, imported or acquired locally, from licenses, customs duties, sales tax, sales levies and any other such fiscal charges
 - Exempts any property and assets from confiscation or expropriation by the Namibian government

Role of local community

- Industry
 - Local Namibian contracts for site infrastructure
 - Steel sourced from South Africa
 - Temperature critical welding expertise sourced from South Africa
 - Recoating of mirrors performed in South Africa
 - Production of 200 new mirrors in South Africa
- Institutions
 - Cooperation with University of Namibia (UNAM) plays an important role as a local partner
 - Provision of two site technicians by UNAM
 - North-West University, South Africa, provides operational expenses of site engineer

Policies: User Access

- HESS is an experiment, run by a collaboration - hence not an 'open' facility
- Annual observation program, based on submitted proposals, decided upon by observation committee
- External user options
 - Very limited, with no support for data analysis
 - Only realistic option is collaboration with an existing HESS group
 - External proposals considered to the extent they add new aspects to existing science program
 - Up to 150 hours available for external proposals

Policies: Data

- Available to all participating institutions, including data analysis software
- Old HESS data not available to public at this stage
- Results
 - Must be agreed upon by HESS collaboration prior to public presentation
- Authorship
 - Open to the entire collaboration for data published for the first time
- Data rights
 - 1 year for external proposers, following which the HESS collaboration may publish on its own accord results based on the data

Construction

- Each partner institute
 - committed to providing the components for which it was responsible
 - responsible for transport of component to HESS site, installation at site and testing
- Safety regulations
 - as applicable in Europe
 - Where conflict arose with local Namibian regulations, local regulations prevailed

Commissioning and De-commissioning

- Commissioning
 - relatively quick, as commissioned without the focal plane instrumentation
 - focal plane instrumentation was a lab tested unit, and installed later with no problems
 - due to operational hours (moonless nights), very little conflict between commissioning and early science
- De-commissioning
 - A defined life cycle of between 10 to 15 years, beyond which institutes are not committed to continue experiment
 - At termination, each institute is responsible, at its own cost, the proper dismantling and removal of equipment it has provided
 - Any buildings constructed for HESS will be given to farmer. In exchange, foundations may be left

Operation

- Site engineer and two technicians are responsible for day-to-day operations of water and electricity (via generator)
- Adjustments to operational scenario plan, following commissioning
 - Initial plan was for HESS to be operated entirely by scientists, coming from Europe and South Africa for 3 week observing sessions
 - Due to significant start-up time losses, and unfamiliarity with operation of telescopes and software, local operator was hired to assist crews
- Annual observations plan
 - Finalised during the preceding year
 - Often rescheduled due to targets of opportunity and weather-related losses
 - On average, approximately 30% of time is rescheduled, although this was expected.

Maintenance

- As operations take place at night, there is significant time available for maintenance
- Approximately 5% of the available dark time is used for calibration
- Each partner institute is responsible for the maintenance and repair of the components of the instrument that it has provided, including necessary materials, equipment and manpower
- Major breakdown or failure of components are classified as common tasks, and dealt with as a whole by the collaboration (on both technical and financial levels)

Funding

- Capital expenses
 - Total capital investment of 7,000,000 euros
 - There is no *a priori* provision for upgrade funds
- Operational expenses
 - 200,000 to 300,000 euros per year
 - Includes
 - Site management and local technical services; insurance; upkeep, cleaning and renovation of buildings; water supply; fuel for power generators; telecommunications fees; maintenance and operating costs for vehicles; materials, tools and parts ordered for common tasks
 - Lifetime costs were not considered
 - Costs shared between institutions, according to the number of scientists involved in experiment (updated yearly). Special arrangements are made for institutions with limited financial resources

Personnel

- Collaborators remain under contract with their respective home institutions, with accorded salary and social benefits
- Home institutions are
 - responsible for necessary insurances for accidents, liability and medical
 - responsible for the cost of travel and subsistence and medical expenses of collaboration, or visiting, scientists
- Tax issues
 - Relevant personal and fiscal data is registered with local/legal advisor, and appropriately transmitted to Namibian authority
 - Income tax matters dealt with in accordance to agreement between Germany and Namibia for the avoidance of double taxation with respect to taxes on income and capital
 - Some scientists working in Namibia may become liable to pay income tax on remuneration related to services rendered in Namibia
 - Max-Planck Institute is obliged to declare taxable income on respective individuals and pays the respective income tax to the Receiver of Revenue in Windhoek on an annual basis