



High Altitude GAMMA Ray telescope (HAGAR)

Mechanical aspects

High Altitude GAMMA Ray telescope (HAGAR):

Completed the conceptual design, supervised the analysis and detail engineering carried out by an outside agency. Fabrication testing and installation of two prototype units at IAO, Hanle has been satisfactorily completed. Also, developed a cable management system for the telescope units. After incorporating changes in design as noted from the performance of the prototypes, selected a vendor for fabricating five more telescope units and presently supervising the fabrication of the five units.

Mechanical Engineering Team

Gabriel F

Kemkar PMMK

Kamath P U

Mahesh P K

Subramanian V K

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Concept report: IIA

Analysis and Detail Engineering:
Multifacet Technical Centre, Bangalore.

First two pieces of telescope manufactured at
Boving Fouress Ltd., Hosakote, Bangalore.

5 pieces being manufactured at
Avasarala Automation, Bangalore.

First two units at the Indian Astronomical Observatory, Hanle

HIGH ALTITUDE GAMMA RAY TELESCOPE (HAGAR)

TECHNICAL SPECIFICATIONS

Latitude of Hanle : 32 47' 46" N

Details of telescope structure and operation :

Mount : Altitude over Azimuth

Zenith cone angle (Blind spot) : 3 degree (diameter)

Pointing Accuracy : 1 arc min rms.

Max speed in Azimuth & Elevation : 30deg/mt.

Configuration : 7 telescopes in an array and each telescope will have 7 mirrors
each of 900 mm diameter

F-ratio of mirror : 1

Mirror Thickness : 12 - 15 mm

Mirror Weight : 20 - 24 Kgs

Distance between each telescope : 50m

Mount size :

Overall height : 3250 mm

Overall length : 3000 mm

Overall Width : 3530 mm

Moving weight : Altitude axis: 1ton

Azimuth axis: 5tons Azimuth

Gear Box Ratio : Combination of Worm & Helical

Azimuth: 3200:1

Elevation: 3000 : 1

Telescope parking position: Horizontal

Mirror Cover: Manual

PMT Shutter movement: Automated

PMT Alignment: Manual

Focus alignment of individual telescopes: One time operation (and locked)
(ST4 camera - finder telescope).

Mirror Cleaning : By dry air/CO₂.

Safety Device : Limit Switches/Mechanical stoppers

Modes of operation:

Bright star monitoring

Sky monitoring - Positioning

On source / Off source

Observation on moonless nights

Details of software : Linux OS

Sun Avoidance & Pointing model (can be added as a software interlock).

GPS interface to the system

Log file.

Source selection from the database of stellar co-ordinates and manual entry

Environment:

Weather station data required. Existing 2mt telescope data being used.

Details of electronics :

Encoder : Absolute encoders 17 bits, on axis for altitude and azimuth

Drive details :

Stepper motor with power supply/controller - 35 Nm at 250 rpm

A preloaded system with springs in the primary spur gear unit and a variable module (duplex) worm gear pair being used to avoid backlash.

Estimated backlash values (by analysis): Azimuth: 10.31 arc sec

Elevation: 13.75 arc sec.

Use of optical cables

Cable Wrap consideration

Pointing to any part of the sky and monitoring the axis positions

Details of control system:

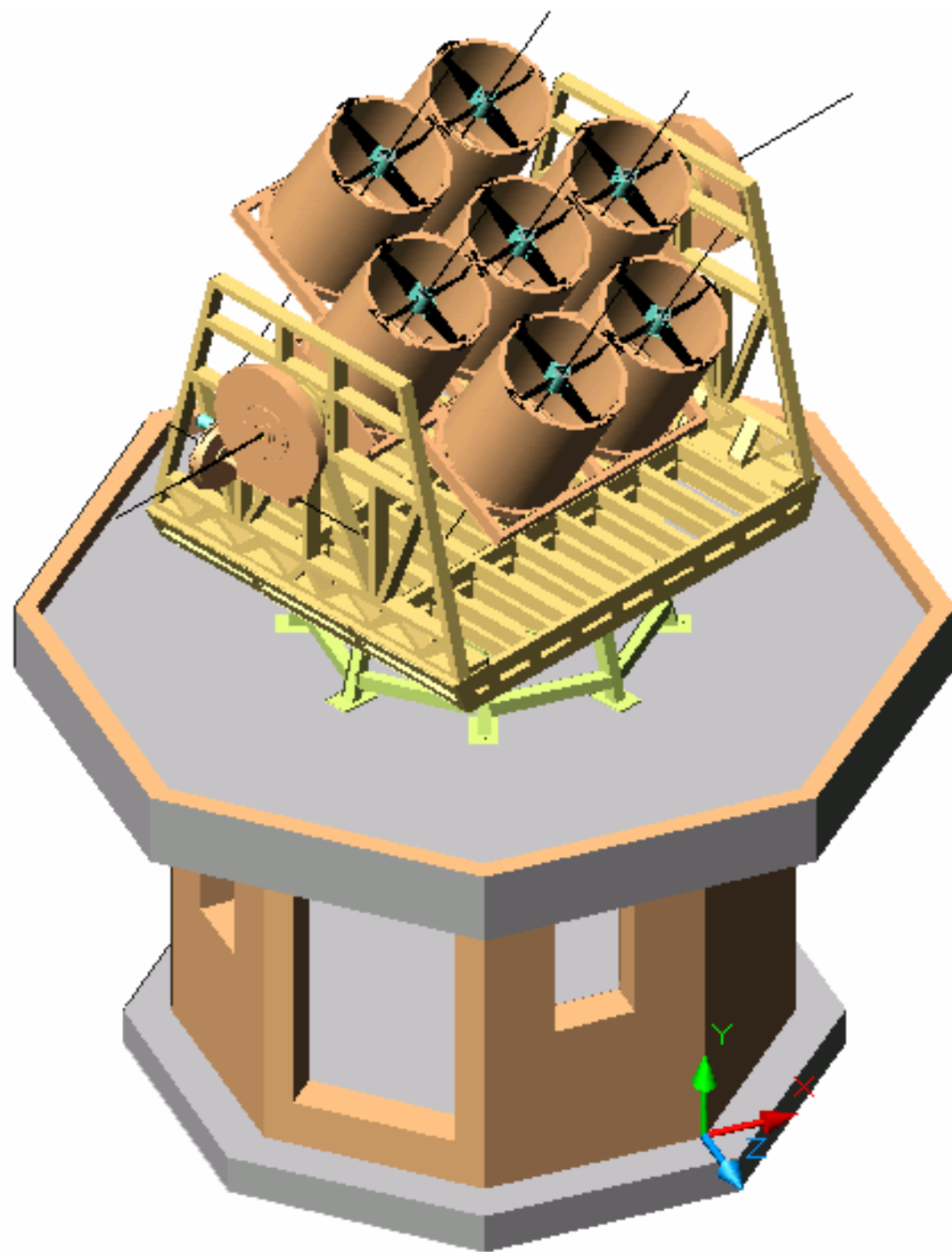
Star topology with one central control computer and monitoring station (client/server model).

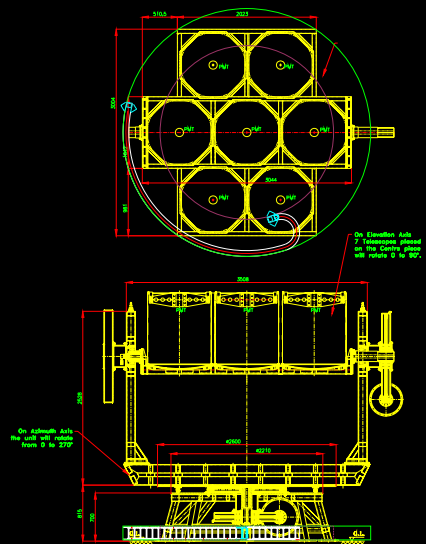
Autoguider / Remote operation : to be finalized.











Project: GEMINID TELESCOPE	FILE	HAGAR
by: Geminid axis in 7m	File	1/1/10
by: Geminid axis in 7m	File	1/1/10
Indian Institute of Astrophysics,	Scale	1:1
Bangalore 560 034	Scale	1:1