The DAG Project

Lorenzo Zago
DAG Project Office
• Let me introduce myself ...

• The DAG telescope

• Enclosure

• Instrumentation

• Planning and programmatic
Let me introduce myself ...

Lorenzo Zago
The DAG telescope
The DAG telescope

- M2 secondary
- Top assembly
- M1 mirror cover
- M1 cell
- M1 primary
- M3 mirror
- M3 tower
- Cable wraps
- ALT bearing
- ALT drives
- Nasmyth platform
- Locking pins
- AZ base structure
- AZ drives
- AZ axis structure
- Center section
### Main specifications

<table>
<thead>
<tr>
<th>Optical</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration</td>
<td>Ritchey-Chretien</td>
</tr>
<tr>
<td>Primary mirror diameter</td>
<td>4 m</td>
</tr>
<tr>
<td>Primary F#</td>
<td>1.8</td>
</tr>
<tr>
<td>Effective focal length</td>
<td>56 m</td>
</tr>
<tr>
<td>Operational waveband</td>
<td>350 to 3000 nm</td>
</tr>
<tr>
<td>Unvignetted FoV (diameter)</td>
<td>30 arcmin</td>
</tr>
<tr>
<td>Nominal science FoV</td>
<td>10 arcmin</td>
</tr>
<tr>
<td>Telescope is diffraction-limited</td>
<td>when operating in adaptive optics correction mode</td>
</tr>
</tbody>
</table>
Telescope optics

- Ritchey-Chretien
- Long focal length -> high resolution
- Large field of view up to 30 arcmin
- Thin primary mirror with active optics
- Stiff secondary and tertiary with active alignment mechanisms
# Main specifications

<table>
<thead>
<tr>
<th>Mechanical - Control</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting</td>
<td>Altitude-Azimuth</td>
</tr>
<tr>
<td>Pointing accuracy, absolute</td>
<td>(&lt; 2) arcsec</td>
</tr>
<tr>
<td>Tracking accuracy, closed loop</td>
<td>(r_{ms} &lt; 0.1) arcsec</td>
</tr>
<tr>
<td>Active optics of primary</td>
<td>66 axial active supports</td>
</tr>
<tr>
<td></td>
<td>24 lateral astatic levers</td>
</tr>
<tr>
<td></td>
<td>6 fixed points (3 axial and 3 tangential)</td>
</tr>
<tr>
<td>Active secondary</td>
<td>5 degrees of freedom for alignment</td>
</tr>
<tr>
<td>Active tertiary</td>
<td>Tip-tilt + Nasmyth axis alignment</td>
</tr>
</tbody>
</table>
Other requirements

- Seismic
- Wind
- Thermal
- ...

...
Adaptive optics

A main driver in the DAG telescope design
Adaptive optics

Two instances are planned for the 1st AO generation:

1. Narrow field ("classical") AO

2. Ground layer AO, allowing FoV up to 5 arcmin
Telescope inside a rotating enclosure
The enclosure

State-of-the-art rotating enclosure

- Large slit door
- Active environment control, (when closed)
- Louvers and wind screen for optimal ventilation (during observations)
- Bridge crane for telescope maintenance operations
Intrumentation

Two Nasmyth foci

NF-1 aimed at adaptive optics instruments

NF-2 for seeing limited instruments

Proposal for the 1\textsuperscript{st} instruments generation
Nasmyth focus 1

NF-1 aimed at adaptive optics instruments

- Derotator
- Field corrector with FoV up to 5 arcmin
- Place for at least two different instruments fed by the AO system
NF-2 for seeing limited instruments

- Adapter-rotator installed on the telescope flange
- Field of view up to 30 arcmin
- One rotating instrument
- Possibility to add more instruments (providing their own derotator)
Observing with DAG

A precious resource to be managed accordingly

- Visitor mode
- Flexible scheduling
- Service observing
Programmatics

International calls for tender and procurements
• Telescope, assigned
• Enclosure
• Coating plant

National procurements
• Architecture and civil engineering
• Civil works and buildings
• All handling equipment
• All services

Coordinated with and by public authorities
• Road accesses

ATASAM and collaborating institutes
• Software and operation

Institutes collaborations
• AO and instruments
DAG: a complex project

A new state-of-the-art observatory is much more than the sum of its physical components.

• It is first of all the making of a complex collaborative know-how.

• Developing this know-how will be one of the major challenges of the DAG project.
DAG: open to collaborations

• The DAG project welcomes collaborations.
• By its very nature, particularly in the fields of
  – control
  – software
  – instrumentation
  DAG will be an open ended project ...

• Whatever is your specialty, related to astronomy or engineering, DAG may very likely take advantage of it.

There is so much to do ... do not hesitate to participate!
A common objective: first light in 2019!

May you build a ladder to the stars and climb on every rung ...

Bob Dylan – Forever young