ABSTRACT
We describe a preliminary conceptual optomechanical design for GMACS, a wide-field, multi-object, moderate-resolution optical spectrograph for the Giant Magellan Telescope (GMT). This poster details the GMACS optomechanical conceptual design, including the requirements and considerations leading to the design, mechanisms, optical mounts, and predicted flexure performance.

INTRODUCTION
This poster presents the preliminary conceptual optomechanical design of the wide field, multi-object, moderate-resolution, optical spectrograph, called GMACS. GMACS (Giant Magellan Telescope Multi-object Astronomical and Cosmological Spectrograph) is a first light instrument for the Giant Magellan Telescope (GMT). High throughput, simultaneous wide wavelength coverage, moderate resolution, and wide field are the crucial design drivers for the instrument.

FOCAL PLANE ASSEMBLY
The focal plane assembly contains the field lens, guide & acquisition camera and the slit mask exchange mechanism. The field lens is a 520mm diameter silica lens that weighs 46kg. The cell design utilizes invar cells RTV pads to hold the lens and flexures to attach the cell to the frame. Four alignment and acquisition cameras are behind the focal plane and will allow precision alignment of the slit masks relative to reference stars. In order to observe objects in different fields throughout the night, a jockey box style exchange mechanism will be used to move various slit masks into the focal plane and back into a storage magazine. There is enough space for 2 slit mask exchange mechanisms that share the same focal plane holder. Each slit mask magazine can hold 18 slit masks for a total of 36 slit masks.

OPTICS MODULE
The optics module contains the collimator, dichroic, gratings and cameras. It also contains the systems to independently articulate & hold the cameras and gratings at various angles to accommodate multiple grating resolutions. In low resolution mode (R=1000) and high resolution mode (R=6000) the collimator-camera angle must be ~18.2° and ~88.9°, respectively. The lens cell concepts for the collimator, dichroic and cameras optomechanical systems will use roller pin flexures and glass filled Teflon plugs to hold the lenses in alignment over varying temperatures.

LOCATION OF THE GMACS INSTRUMENT WITHIN GMT

The current GMACS design is a preliminary concept, evolving from the 2012 conceptual design, while scaling its size down to meet budgetary constraints. The scope of the current optomechanical design is to illustrate how the optics and subsystems will be packaged, simulate articulation ranges of the moving components & identify potential collisions, estimate initial instrument envelope and weight, investigate GMT interfacing, and determine expected deformations.

INSTRUMENT FRAME
GMACS’s steel tubular spaceframe structure will hold the instrument subassemblies together and attach the instrument to the back of the GMT. The spaceframe style will be very stiff and will help evenly distribute the instrument load to the GMT mechanical interface. This design demonstrates a sphere and cone system as an alternative attachment method to the back of the GMT.

Preliminary FE Analysis Results

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