**Budget Request**

We request $388,354 in funding for FOBOS.

* Project development and planning towards MSIP: $53,200 (9/2019 – 2/2020)
  + Scheduling and budget perpetration (Savage/MacDonald)
  + Project Execution Plan (Savage/MacDonald)
  + Development of systems engineering plan WBS, PBS, and list of IDCs (Savage/MacDonald)
  + Preparation of proposal ancillary materials (Savage/MacDonald)
* Continued conceptual design of ADC and Focal plane robotics: $18,680 (7/2021 – 9/2021)
  + ADC cell development (Miller/MacDonald)
  + Focal plane motion systems (MacDonald)
  + Controls description (Deich)
* Positioner Technology Development $130,032 (9/2019-2/2020)
  + AAO Contracts totaling $60,000
    - Positioner trade between zonal systems and StarBugs, Risk retirement and performance evaluation, AAO project development plan and cost to complete
  + Support and design work associated with AAO Contracts $52,320
    - MacDonald, Westfall, Savage, and Travel to AAO (3 trips)
  + Focal plane conceptual design advancement $17,760
    - Focal plane arrangement, actuator support system, feed-back system CoD.
* Fiber system and forward optics design $24,680 (7/2019 – 11/2020)
  + System level fiber design, MSIP preparation (Poppett)
  + *NOTE: Much of the work needed on this sub system is funded by UCO mini grant "FIDDLES."*
* Spectrograph $9,800 (9/2019 – 11/2019)
  + System level update for MSIP (Miller/Kupke)
  + *NOTE: The spectrograph design matured significantly during the Fiber-WFOS work for TMT.*
* Calibration system $44,128 (Ongoing – 11/2020)
  + Requirements development (Yan, Westfall)
    - *NOTE: 1 month summer salary and travel support to R. Yan is requested.*
  + Screen CoD (MacDonald/WMKO)
  + Lamp CoD (MacDonald/WMKO)
* Data systems and simulations $34,800 (Ongoing – 2/2020)
  + Requirements development
  + System simulator
* Operational software: Targeting, GUI, top level control: $55,680 (9/2019 – 3/2020)
  + Targeting simulator (Wesftall)
  + Design description document (Westfall/Deich)
  + Keck Interface document (Deich/WMKO)