

# Request for Proposal

RFP No. **TBD**

## VIRUS Detector System Design, Fabrication, Integration, Testing and Delivery

**Issued by:** McDonald Observatory  
The University of Texas at Austin  
1 University Station  
Austin, TX 78712

**For:** The Design, Fabrication, Integration and Test of the  
VIRUS Detector System

**RFP Date:** **TBD**

**Proposal Due Date:** **TBD**

**Point of Contact for  
Questions and Comments:** **TBD**

Function	Signature	Date
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## Revision Summary

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# 1 Overview

This Request for Proposal (RFP) seeks proposals from qualified Proposers to carry out the Statement of Work (SOW) defined in the *VIRUS Detector System Statement of Work* (HX0032), hereafter referred to as the SOW, and its applicable Specification Document *VIRUS Detector System Specification* (HX0031). These Instructions to Bidders provide information on the details of the procurement process and specific instructions for how to prepare bids in response to this RFP.

Note that an additional document entitled *VIRUS Spider Assembly* (HX0049) is provided as part of this RFP. This document contains the CAD data for the Spider Assembly Reference Design. It is provided for illustrative purposes only and does not provide a design specification for the Spider Assembly or any of its related components. Note that HX0049 is being provided in the following four file formats:

- .ZIP which contains the native SolidWorks files
- .STEP which contains the CAD data in generic STEP format
- .PPT which shows some images of the assembly in full, cutaway, and exploded views
- .PDF which is a 3D PDF file

# 2 Background

The McDonald Observatory, a unit of The University of Texas at Austin (hereinafter referred to as the University), operates the Hobby-Eberly Telescope (HET) for an international consortium of astronomy research institutions. See <http://www.as.utexas.edu/mcdonald/het/het.html> for information about the HET and the HET Consortium.

The HET is an innovative large telescope of 9.2 meter aperture, located in West Texas at the McDonald Observatory. A major upgrade of the HET is in progress that will substantially increase its capabilities. This includes development and deployment of a revolutionary new integral field spectrograph called VIRUS (the Visual Integral-Field Replicable-Unit Spectrograph), in support of the Hobby-Eberly Telescope Dark Energy Experiment (HETDEX). VIRUS consists of up to 192 simple fiber-fed spectrographs, each of which contains a camera that employs a cryogenically cooled 2048 by 2048 pixel Charge Coupled Device (CCD).

The present procurement is for the detailed design, fabrication and test of the VIRUS detector system (which consists of the spectrograph CCDs, CCD controller(s) with data acquisition computer software and hardware interfaces, and associated interconnects) that meets the above-referenced performance specifications as per the above referenced SOW.

As part of the information provided to assist in the preparation of proposals, a reference design is provided in HX0031 to help illustrate the characteristics of the detector system. It is important to note that this reference design is for illustrative purposes only and does not provide a design specification for the detector system or any of its components. As

described in the SOW, the Proposer is required to carry out a complete design analysis and is responsible for developing the specifications for all components necessary to assure that the completed detector system meets all requirements of the Specification.

### **3 Preparation for Proposals**

Four (4) hard (paper) copies and two (2) electronic copies (PDF format on CD-ROM) of a detailed Proposal shall be submitted sealed and shall be organized in accordance with the categories outlined in Section 11, Proposal Preparation Instructions.

Proposals shall be delivered no later than the date set forth on the title sheet of this RFP to:

UT Purchasing Department  
Attn: Trina Bickford  
2200 Comal Street  
Austin, Texas 78722

Any Proposal received after the close of business (5:00 p.m. U.S. Central time) on the stated date will not be considered.

Proposals must set forth full, accurate, and complete information as required in this RFP. Proposals that are incomplete or partial in any material respect affecting the responsiveness of the Proposal will not be considered.

Proposals submitted in response to this RFP shall be in the English language. Proposals received in other than English shall be rejected.

The University reserves the right to (1) postpone the date of submission, (2) to amend this RFP, as it considers necessary, and (3) to waive informalities and minor irregularities in Proposals received.

### **4 Method of Procurement**

The University intends to negotiate a firm fixed-price Contract for the entire scope of the work as defined herein with the successful Proposer, and intends to award the Contract to the qualified Proposer whose Proposal is most advantageous to the University, all factors considered.

The University reserves the right to make an award based on the Proposer's initially proposed price without discussion of such Proposal. The University is not obligated to award all or any part of the work solicited, and in any event will not be responsible for the cost of Proposal preparation or any other cost incurred in connection with this RFP. Further, the University reserves the right to accept other than the lowest price Proposal.

## **5 General Pricing Information**

Prices on the proposal shall be quoted to complete the scope of work described in the Statement of Work described in HX0032 and meeting or exceeding the requirements presented in HX0031.

The Pricing Form, Appendix A, must be completed accurately and fully without any erasures or omissions.

Price quotes submitted in response to this RFP shall be in terms of U.S. dollars. Offers received in other than U.S. dollars shall be rejected.

## **6 Pre-Bid Teleconference**

To further assist Proposers in the preparation of Proposals, the University will hold a pre-bid teleconference shortly after the release of the RFP. Information about the schedule for the teleconference will be provided under separate cover.

Participation in the pre-bid teleconference is not mandatory. All questions posed at the teleconference and their answers will be provided to all Proposers in writing or via email.

## **7 Explanation of Proposals**

During the procurement phase, all contact between Proposers and the University must be made through the RFP Point of Contact. Direct contact by a Proposer with any University employee other than through the RFP Point of Contact may result in disqualification. The University will not be bound by any oral interpretations of the RFP documents.

Should a Proposer find any discrepancies in, or omissions from, any of the RFP documents, or be in doubt as to the meaning of any RFP document, it shall immediately advise the RFP Point of Contact in writing or by email. Explanations or clarifications will be posted and made available to all recipients of the Request for Proposal on the RFP web site (URL **TBD**) and sent to all RFP recipients.

## **8 Criteria for Proposal Evaluation**

The criteria for evaluating proposals in response to this RFP, in order of importance are:

1. Overall technical merit of the proposal (30%)
  - a. Responsiveness to the Statement of Work and Specification
  - b. Performance of proposed design and ability to meet or exceed all performance specifications
  - c. Suitability of proposed design
  - d. Methods of assuring compliance with specifications.
2. Life-cycle cost (30%)
  - a. Proposed price
  - b. Cost to the University of University supplied Components and related systems impacted by the proposed design
  - c. Price of spare parts required to support a 20-year system lifetime.
3. Assessment of technical and programmatic risk (30%)
  - a. Adequacy and availability of facilities and resources required to carry out the scope of work
  - b. Experience and effectiveness of Proposer's organization and proposed management approach
  - c. Competence, experience and availability of the key personnel assigned to the project
  - d. Completeness and adequacy of the project plan
  - e. Similarity of existing products to the proposed system.
4. Proposed delivery schedule and demonstrated and perceived ability to deliver according to the delivery plan (10%).

The University recognizes that in the course of performing the work necessary to develop a compliant response to this RFP, potential contractors may create an initial design which is a significant improvement over the reference design described in HX0031. This enhanced design may offer 1) substantial performance improvements, 2) reduction in price, 3) some other substantial improvement, or 4) some combination of 1 through 3.

While the University desires bid packages that meet the baseline specifications and requirements, we also encourage the development of improved designs that may offer any combination of the above advantages over the reference design. Should the Contractor choose to offer such a design as a bid option in addition to the baseline bid package, the cost difference shall be reflected in the appropriate section of the pricing table. The Contractor shall also include a discussion of the advantages and disadvantages of the offered alternate design.

## **9 Amendment, Withdrawal or Resubmission of Proposal**

Amendment, withdrawal or resubmission of the Proposal will be permitted prior to the Proposal due date and time.

## 10 Validity of Proposal

Proposals submitted in response to this RFP shall be valid for 120 calendar days from the Proposal due date.

## 11 Proposal Preparation Instructions

The Proposal shall be organized in the following sections:

Section 1: Management Proposal  
Section 2: Project Plan and Schedule  
Section 3: Technical Proposal  
Section 4: Price Proposal

There are no page limits to any section of the Proposal, but Proposers should provide the required information as concisely as possible to facilitate review.

Each section of the proposal shall include the detailed information listed below and any other information the Proposer feels will assist each reviewer's assessment of the proposal.

### 11.1 Management Plan

This section shall include information about the Proposer's management plan for the accomplishment of all aspects of the project, as well as information regarding the Proposer's personnel, resources, experience and past performance, that demonstrates its capability to produce the detector system.

- *Team Structure and Organization*

Provide an organization chart showing the proposed project organization. Describe the management of both in-house and outsourced work, including administration and supervision.

- *Management Methods and Qualifications*

Describe methods and qualifications as related to this project, including project management, subcontracting, purchasing, quality controls, etc.

- *Key Personnel*

Provide the names and functions of all key personnel. List key management and technical personnel expected to be assigned to this project in all areas of the project and include their curriculum vitae. State how long each key person has been a regular, full-time employee with the company.



- *Subcontractors*

List by name all subcontractors and consultants that are proposed for the project, and describe the area of work, qualifications and capabilities of each subcontractor and consultant for their respective area of project involvement. The degree of commitment (e.g., verbal discussions to signed firm agreement) of each subcontractor shall be identified. If a major portion of the effort will be subcontracted to one or more subcontractors, describe previous experience with similar collaborations and how the subcontracted effort will be managed.

- *Facilities, Resources, and Capabilities*

Describe facilities, facility location(s), and capabilities for design, engineering, manufacturing, assembly and testing. Specifically address the facilities which will be utilized on the project.

- *Financial Capacity*

Provide financial statement of the Proposer company and any parent organization for the past five years. Specify the total current backlog of work under contract or subcontract and the estimated completion dates, including an explanation of how the current backlog may affect the Proposer's ability to be responsive to the schedule requirement of the project.

- *Related Experience and Past Performance*

Provide a description of related experience and work similar to the work in this proposal: contract source, price, schedule, delivery date and customer contact information for projects of similar size and character designed or constructed by the Proposer.

## **11.2 Project Plan and Schedules**

This volume shall include information about the Proposer's plans and schedules for the accomplishment of all aspects of the project. It shall include a master summary schedule and detailed schedules showing all aspects of the work from contract award through project completion with starting and completion dates and significant milestones for accomplishing tasks. With the schedule, the Proposer shall include a schedule risk analysis and proposed countermeasures to be undertaken in the event of schedule delays.

This section shall include the following information:

- *Project Plan*

Describe the overall design and development process proposed using reference to the Technical Proposal for details. Describe the steps required to manufacture the components of the detector system and assemble them into a finished detector system.

- *Work Breakdown Structure*

Provide a detailed Work Breakdown Structure (WBS) of all activities required to complete the project.

- *Gantt Chart Schedule*

Provide a Gantt Chart schedule showing the proposed timeline, critical links between tasks, and formal meetings/reviews with University project personnel (e.g., PDR and CDR).

Note that Table 1 of HX0032 presents suggested milestones and dates. These dates are negotiable (especially those indicated as TBD). Although the University prefers delivery of the first production run no later than 12 months ARO, a later delivery will be seriously considered (especially if it results in a lower price and/or less technical risk and/or a significantly better design). If a later delivery is proposed, explain why it is necessary and what, if any, benefits it offers the University.

- *Schedule and Cost Risk*

Describe the major schedule and cost risks and any plans for mitigating those risks.

## **11.3 Technical Proposal**

The Technical Proposal shall describe clearly and completely the technical approach to be taken in fulfillment of the Statement of Work and Specification. Proposers shall demonstrate a clear understanding of the Specification and the Statement of Work. Technical concepts shall be in sufficient detail to permit evaluation of the proposed detector system design.

This section shall include the following information:

- *Proposed Design*

Provide a detailed description of the proposed design, including all major components and features. Special attention should be paid to components critical to meeting the signal noise requirements (especially crosstalk), and protecting the hardware

(especially CCDs) from damage due to detector system component failures and improper handling.

Describe the CCD temperature control circuit, especially with regard to its effect upon CCD noise during data acquisition and readout periods.

Provide a block diagram illustrating the system hardware architecture and interconnects between primary components. Indicate the location of each component (e.g., inside the cryostat, inside the spectrograph electrical enclosure, inside the upper electrical room). Also provide an estimate of each component's form factor (e.g., length, width and height) and power dissipation.

Provide a description of the software interface and software development activities needed to meet the detector system specification.

- *Reliability and Maintainability*

It is imperative that the detector system be easy to set up, reliable, and easy to troubleshoot and repair. Discuss the system reliability and maintainability. As part of this discussion include the following:

- List parameters that must be set up manually (e.g., dip switches)
- List parameters that can be set via computer control
- Estimated Mean Time Between Failure (MTBF) and Mean Time to Repair (MTTR) for the entire system and rationale used to derive the estimates
- Description of the detector system troubleshooting strategy with a list of potential field-replaceable components and potential hot-swappable components
- Design features which facilitate troubleshooting and repair
- Spares strategy required to meet the MTBF and MTTR requirements over the system's 20-year lifetime

- *Cleanliness Standards*

Provide a description of cleanliness standards that will be followed during integration and testing of the detector system items that are contained within the vacuum cryostats. Describe the types of contamination (on the CCD active area) that can be removed without significantly degrading CCD performance, and how the contamination is removed.

- *Other Standards*

Provide a list of EMC and other standards that the detector system will comply to.

- *Factory Acceptance Test*

Provide a brief description of the Factory Acceptance Test (FAT) procedure methodology that will be used to demonstrate that critical performance specifications

(especially quantum efficiency, readout noise, charge transfer efficiency, linearity, residual charge images, and crosstalk) will be met at operating temperature. Describe all test equipment that must be purchased and/or developed to support the FAT. As part of the discussion, answer the following questions:

- Will the tests be limited to representative batch testing or will all components be tested?
- Does the University need to furnish any hardware or software to support the tests (e.g., VIRUS spectrograph vacuum cryostats)?
- Will University funds be used to develop and/or purchase test equipment required to support this project? If so, provide a description of the equipment.

- *Technical Cost Drivers*

Identify specifications or technical requirements that are the cost drivers in the project. Make suggestions of how to relax requirements and specifications that may make the project more efficient and less costly. Describe and explain the correlation between specification reduction and cost savings.

- *Compliance Matrix*

Provide a compliance matrix (in Microsoft Excel format) which addresses every requirement in the specification. The matrix shall have five columns:

- Column 1) Specification item number
- Column 2) Requirement
- Column 3) Proposed verification method – see Table 1
- Column 4) Statement of compliance – see Table 2
- Column 5) Notes and comments

<b>Method</b>	<b>Notes</b>
Review (R)	The design is reviewed and it is obvious to all whether or not the item is in compliance.
Inspection (I)	The completed item is inspected and compliance can be easily observed.
Testing (T)	This entails a technical effort whereby the system is stimulated in a certain fashion and its response is compared to the required response.
Analysis (A)	Compliance of the design to the requirements is proved by mathematical analysis.

**Table 1:** Acceptable verification methods.

<b>Degree of Compliance</b>	<b>Notes</b>
Comply (C)	Proposed system is 100% compliant. If the proposed system exceeds the requirement, state to what extent the requirement is exceeded.
Partial Compliance (PC)	Proposed system is in partial compliance. Proposer shall provide a statement which clearly indicates which aspects of the requirement are in compliance.
Not in Compliance (NC)	Proposed system does not comply with the requirement.
Goal (G)	The Proposer shall attempt to meet this requirement as a goal. Proposer shall provide a statement describing how they will try to meet this requirement and the likelihood that they will be able to meet this goal.

**Table 2:** Acceptable statements of compliance. Note that some of the requirements in the specification are stated as goals. If the proposer intends to meet or exceed a goal, Column 4 of the compliance matrix should be marked with a “C”.

## 11.4 Price Proposal

The Price Proposal shall include pricing information to complete the scope of work described in the Statement of Work (HX0032) and to meet or exceed the requirements presented in HX0031. Note that the price proposal should assume that the detector system components will be shipped to Austin, Texas.

In addition to the above, Proposers are encouraged to offer options that require modifications to the Statement of Work or the Specification that could benefit the University by reducing cost, increasing performance or reducing risk. This includes modifying the baseline schedule (as implied by Table 1 in HX0032) and/or identifying items that are not cost effective for the Proposer to supply. Where such options are proposed, the Price Proposal shall include sufficient detail to define any and all required changes to the Statement of Work or Specification.

Proposers are required to include the following items as part of their Price Proposal:

- Completed Price Sheets as per Appendix A
- Desired payment schedule
- Labor and travel rates to support field service work at the following locations in Texas: Austin, College Station, and the McDonald Observatory near Fort Davis.

All price information shall be in U.S. dollars.

## 12 Terms and Conditions

**TBD**

## **Appendix A – Price Sheets**

## VIRUS Detector System Price Sheet

Item/Task	Labor (hours)	Price (\$) Labor	Price (\$) Travel	Price (\$) Subcontracts	Price (\$) Materials	Price (\$) Other	Price (\$) Total
<b>Section 2 Design VIRUS Detector System and Test Articles</b>							
<b>Section 3 Develop CCD Measurement Procedure</b>							
<b>Section 4 Develop Factory Acceptance Test</b>							
<b>Section 5 Fabricate and Test TA1</b>							
<b>Section 6 Fabricate and Test TA2</b>							
<b>Section 7 Conduct Training</b>							
<b>Section 8 Produce VIRUS Detector System and Conduct FATs</b>							
Production run 1 with FAT							
Production run 2 with FAT							
Production run 3 with FAT							
Production run 4 with FAT (assuming that the University decides to order this option at the beginning of the contract)							
Change in the cost of production run 4 if the University decides not to order this option until just before approval is given to start production run 1							
<b>Section 9 Packing and Shipping</b>							
Production run 1							
Production run 2							
Production run 3							
Production run 4							
<b>Section 10 Project Organization and Control</b>							
<b>Section 11 Reviews and Meetings</b>							
<b>Section 12 Documentation and Other Deliverables</b>							
Requirements 12.1 through 12.10							
Items as per requirement 12.11							
Test Equipment as per requirement 12.12							
<b>Section 13 Spares</b>							
Spares required to support spares strategy for a 20-year period							
<b>Section 14 Warranty</b>							
<b>Other</b>							
Total							



### **VIRUS Detector System Itemized Materials Price Sheet**

<b>Item/Task</b>	<b>TA2 (\$)</b>	<b>Production Run 1 (\$)</b>	<b>Production Run 2 (\$)</b>	<b>Production Run 3 (\$)</b>	<b>Production Run 4 (\$)</b>
CCDs					
CCD Controllers and Auxiliary Controllers					
Data acquisition computer interface					
Interconnects					
Other					