

CONTRACTUAL AGREEMENT

For

INVITATION TO NEGOTIATE (ITN) #: ITN2021-08TCSA

ENTITLED: WIDEBAND CRYOGENIC FRONT END

Between

THE UNIVERSITY OF CENTRAL FLORIDA BOARD OF TRUSTEES AND CRYOELEC
LLC

This Agreement is entered into and effective as of the date of the last signature hereto, by and between The University of Central Florida Board of Trustees (“University” or “UCF”) and CryoElec LLC (“Contractor”). The parties agree as follows:

1. **ACKNOWLEDGMENT.** The Contractor acknowledges that:
 - A. The University is a public entity of the State of Florida;
 - B. The University is exempt from federal and Florida taxes;
 - C. Except for its employees acting within the course and scope of their employment, UCF shall not indemnify any entity or person and, then, such indemnification is limited to the express terms of §768.28, Florida Statutes. The University of Central Florida is self-insured to the extent of its liability under law, and any liability in excess of that specified in statute may be awarded only through special legislative action. Accordingly, UCF’s liability and indemnification obligations in this Agreement shall be effective only to the extent expressly required by §768.28, Florida Statutes. Any provision requiring UCF to provide insurance coverage other than the State of Florida self-insurance shall not be effective.

2. **DESCRIPTION OF SERVICES.** The Contractor will provide a wideband (2 to 14 GHz), cryogenic front-end receiver for the 12m telescope located at the Arecibo Observatory (AO). Goods/services shall be provided in accordance with UCF’s Invitation to Negotiate (ITN)/Invitation to Bid (ITB) 2021-08TCSA and the Contractor’s Offer in response thereto, both of which are incorporated by reference and the terms of this Agreement. The Contractor is an independent contractor pursuant to Florida law and assumes full responsibility for completion of the services/delivery of the goods, as described in detail in Attachment “B” to this Agreement, which is incorporated herein for all purposes. Such services/goods shall be rendered/delivered in accordance with the schedule and for the amounts set forth in Attachment “A”.

3. **CONTRACT TERM.** The Contractor shall commence performance of the terms of this Agreement on date of the last signature hereto (“Effective Date”) and shall end his/her performance on December 15, 2022. The University may renew/extend this Agreement, as mutually agreed to by both parties. Total renewals shall not exceed 5 years or twice the length of the original term, whichever is longer. An extension may not exceed 12 months or until completion of the competitive solicitation and award or protest, whichever is longer.

4. PAYMENT.

- A.** The University shall have sufficient time (as determined by the University) after its actual receipt of ordered goods or services to inspect and approve/disapprove the goods and/or services. It is the policy of the University that invoices on goods and/or services that have been received, inspected and approved by the University will generally be paid within thirty (30) days of the University's receipt, inspection and approval thereof. Until the University receives a properly completed invoice, the payment process will not begin.
- B.** Advance payment for goods and services shall not be made except in accordance with applicable Florida law.
- C.** The University shall not be bound to any prepayment penalty clauses.
- D.** Bills for approved travel expenses shall be submitted in accordance with §112.061, Florida Statutes. The University may establish rates not to exceed the maximum allowed as provided in §112.061, Florida Statutes. The University reserves the right not to pay travel expenses unless the University approves such expenses in advance, in writing. The University has the right to make travel arrangements for the Contractor.
- E.** Bills for fees or other compensation for services or expenses shall be submitted in sufficient detail with supporting documentation sufficient for pre-audit and post-audit.

5. CONTRACTOR OMBUDSMAN STATEMENT. The University has established a Contractor Ombudsman who acts as an advocate for contractors who may be experiencing problems in obtaining timely payment(s). The Contractor Ombudsman may be contacted at (407) 882-1082.

6. ANNUAL APPROPRIATION. The University's performance and obligations under this Agreement are subject to and contingent upon annual appropriations by the Florida Legislature and other funding sources.

7. ASSIGNMENTS. Under no circumstances shall the Contractor assign to a third party any right or obligation of the Contractor pursuant to this Agreement without prior written consent of the University. If the Contractor is, or during the term of this Agreement becomes, an individual on the payroll of the State of Florida, the Contractor represents that he or she has complied with all applicable provisions in the Florida Statutes and Florida Administrative Code regarding outside or dual employment and compensation.

8. BILLING. The University shall only submit payment to the Contractor if the Contractor has provided the University with approved invoices. Mere statements in lieu of approved invoices will not be accepted by the University. All invoices must specifically describe the services and/or goods provided, the dates and hours that the services were rendered and/or goods delivered and the fee charged. The Contractor shall deliver the invoices to UCF's Division of Finance, unless the Contractor has been otherwise instructed by the University. The Contractor must display the applicable purchase order number on the face of each of

the Contractor's invoices to the University. The University will not be responsible for any goods or services delivered without a properly completed University purchase order or other order provided in writing by a duly authorized University signatory or designee. If the Contractor's invoice lists any freight or cartage charges, such invoice must attach all of the Contractor's receipted transportation bills.

9. **CANCELLATION/TERMINATION.** This Agreement may be unilaterally cancelled by UCF for refusal by the Contractor to allow public access to all documents, papers, letters, or other materials subject to the provisions of Chapter 119, Florida Statutes and made or received by the Contractor in conjunction with this Agreement. UCF also may terminate this Agreement without cause on thirty (30) days' advanced written notice to the Contractor. The parties to this Agreement may terminate the Agreement at any time by mutually consenting in writing. Either party may terminate this Agreement immediately for breach by the other that remains substantially uncured after thirty (30) days' advanced written notice to the breaching party, which notice describes the breach in detail sufficient to permit cure by the breaching party. The University shall be liable only for payment for services satisfactorily rendered/goods satisfactorily delivered and accepted from the date of commencement until the effective date of cancellation/termination.
10. **COMPLIANCE.** The parties shall at all times comply with all applicable ordinances, laws, rules and regulations of local, state and federal governments, or any political subdivision or agency, or authority or commission thereof, which may have jurisdiction to pass laws, ordinances, or make and enforce rules and regulations with respect to the parties.
11. **EXPORT CONTROL.** The parties shall comply with all applicable U.S. export control laws and regulations, including but not limited to the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120 through 130, the Export Administration Regulations (EAR), 15 CFR Parts 730 through 799 and/or other restrictions imposed by the Treasury Department's Office of Foreign Asset Controls (OFAC), in the performance of this Agreement. The parties agree that no technology, related data or information will be exchanged or disseminated under this Agreement nor any collaborations conducted pursuant to this Agreement that are export controlled pursuant to the export control laws of the United States, including the EAR, ITAR, and any other applicable regulations. The Parties agree that the Contractor will not provide the University with any ITAR or EAR restricted technology and/or related data, and that any ITAR or EAR restricted technologies and/or data produced in furtherance of this Agreement will be in the exclusive possession of the Contractor, and at no time will any export controlled technologies, related data, or information be intentionally or inadvertently transferred to the University, its facilities, labs, staff, researchers, employees, officers, agents, servants or students in the performance of this Agreement. If the Contractor wishes to disclose export-controlled technology or technical data to the University, the Contractor will, prior to disclosing any information, technical data or source code that is subject to export controls under federal law, notify the University in writing that the material is export controlled and shall identify the controls that apply. The University shall have the right to decline or limit (a) the receipt of such information and (b) any task requiring receipt of such information. In the event the Contractor sends any such technical data or product that is subject to export control without

notice of the applicability of such export control, the University has the right to immediately terminate this Agreement. The Contractor understands and agrees that to the extent the Contractor's personnel have access to work or materials subject to U.S. export controls while on University property, such personnel will meet all federal export control regulatory requirements or have the appropriate U. S. government approval.

12. **CONFLICTS OF INTEREST.** Acceptance of this Agreement shall certify that the Contractor is aware of the requirements of Chapter 112, Florida Statutes and in compliance with the requirements of Chapter 112, Florida Statutes and other laws and regulations concerning conflicts of interests in dealing with entities of the State of Florida. The Contractor certifies that its directors and/or principal officers are not employed and/or affiliated with the University unless a current Conflict of Interest (Report of Outside Activity/Employment) form has been completed, executed by such director or officer and approved in accordance with applicable University policies or rules. Violation of this section by Contractor shall be grounds for cancellation of this Agreement.
13. **DELIVERY.** Delivery is to be made to the "Ship To" location shown on the face of this purchase order. When delivery is specified to a location other than the University's Central Receiving Department, the Contractor shall direct its carrier to telephone the University's Central Receiving Department before unloading. Delivery of all shipments shall occur between 9:00 a.m. and 4:00 p.m., Mondays through Fridays only, except on State of Florida or U.S. holidays, or University holidays or closures. Indicated on the face of this purchase order is the "Delivery Desired By" date; failure to make delivery by or before "Delivery Desired By" constitutes cause for cancellation of this Agreement by the University. The University of Central Florida is committed to sustainable practices. Palletized shipments should not exceed 1500 pounds per pallet and when possible, should be shipped on a 40"x 48" pallet. The Contractor shall include a packing list showing contents of shipment (if shipment is made in two or more containers). No boxing, packing, installation, assembly, or similar charges (not included in the item price) will be allowed unless expressly and specifically authorized in writing by the University on the face of this purchase order.
14. **EMPLOYMENT OF ALIENS.** The Contractor's employment of unauthorized aliens, if any, shall be considered a violation of §§274(e) of the Immigration and Nationality Act. If the Contractor knowingly employs unauthorized aliens, such violation shall be cause for unilateral cancellation of the Agreement by the University.
15. **FORCE MAJEURE.** No default, delay or failure to perform on the part of UCF shall be considered a default, delay or failure to perform otherwise chargeable, hereunder, if such default, delay or failure to perform is due to causes beyond UCF's reasonable control including, but not limited to, strikes, lockouts, actions or inactions of governmental authorities, epidemics, pandemics, wars, embargoes, fire, earthquakes, acts of God, or default of common carrier. In the event of such default, delay or failure to perform due to causes beyond UCF's reasonable control, any dates or times by which UCF is otherwise scheduled to perform shall be extended automatically for a period of time equal in duration to the time lost by reason of the cause beyond the reasonable control of UCF.

16. **GOVERNING LAW AND VENUE.** This Agreement and any attachments and addenda hereto are subject to and governed by Florida law. Venue for any action arising hereunder shall be in Orange County, Florida. The University is entitled to the benefits of sovereign immunity, including immunities from taxation.
17. **HEADINGS.** Headings have been included in this Agreement for convenience only and shall not affect the interpretation of any terms found herein.
18. **INDEMNIFICATION.** The Contractor shall hold the University of Central Florida Board of Trustees and the University's officers, employees, agents and/or servants harmless and indemnify each of them against any and all liabilities, actions, damages, suits, proceedings, and judgments from claims arising or resulting from the acts or omissions of the Contractor, its employees, its agents or of others under the Contractor's control and supervision. If any part of a delivery to the University pursuant to this Agreement is protected by any patent, copyright, trademark, other intellectual property right or other right, the Contractor also shall indemnify and hold harmless the University of Central Florida Board of Trustees and the University's officers, employees, agents and/or servants from and against any and all liabilities, actions, damages, suits, proceedings and judgments from claims instituted or recovered against the University by any person or persons whomsoever on account of the University's use or sale of such article in violation of rights under such patent, copyright, trademark, other intellectual property right or other right.
19. **INDEPENDENT CONTRACTOR.** Each of the parties is an independent contractor and nothing contained herein shall constitute or designate any of the employees or agents of one party as employees or agents of the other party.
20. **NO JOINT VENTURE.** Nothing contained in this Agreement shall be construed to create a joint venture, partnership, or other like relationship between the parties.
21. **LEASED EQUIPMENT.** The risk of loss or damage to leased equipment, goods or property shall not transfer to the University except as provided in §680.219, Florida Statutes. Any security interest in the leased equipment, goods or property granted to the Contractor contrary to AGO 79-72 and AGO 80-9 is null and void. Limitations of remedies provisions, which are unconscionable under applicable Florida law, are void.
22. **MATERIAL SAFETY DATA SHEET (MSDS).** In compliance with Florida Statutes, Ch. 442, a Material Safety Data Sheet (MSDS) must accompany any applicable item delivered under this Agreement.
23. **NON-PERFORMANCE.** Neither party shall be required to perform under this Agreement or any attachments or addenda hereto executed by the University's duly authorized signatory when such performance is delayed or prevented by any cause beyond the party's or parties' control. This Agreement and any attachments and addenda hereto executed by

the University's duly authorized signatory may not be altered, amended or assigned without the prior written agreement of all the parties.

- 24. NOTICES.** Any written notices between the parties shall be sent by certified mail to the following addresses, or other addresses of which the parties shall have notified each other.

For UCF:

Procurement Services
12424 Research Pkwy, Ste 355
Orlando, FL 32826
Email: procurement@ucf.edu

For Contractor:

CyroElec LLC
Attn: Hamdi Mani
809 W Bentrup St.
Chandler, AZ 85225
Email: info@cyroelec.com

- 25. PARKING.** The Contractor shall ensure that all vehicles parked on campus for purposes relating to work resulting from this Agreement shall have proper parking permits. This applies to all personal vehicles and all marked and unmarked company vehicles that will be on any University campus for one (1) day or more or on a recurring basis. All such vehicles must be registered with University's Parking Services Department, and parking permits must be purchased by the Contractor. The Contractor's vehicle(s) shall observe all parking rules and regulations. Failure to obtain parking permits, properly display them, and otherwise comply with all of the University's parking rules and regulations could result in the issuance of a parking ticket and/or towing at the expense of Contractor or Contractor's employees. UCF's Parking Services Department can be contacted at (407) 823-5812 for additional information pertaining to parking and parking fees/rates.

- 26. WORK FOR HIRE.** Any work specifically created for the University under this Agreement by the Contractor or anyone working on behalf of the Contractor (the term Contractor shall encompass both) shall be considered a "work for hire." All designs, prints, paintings, artwork, sketches, etchings, drawings, writings, photographs, or any other work or material or property produced, developed or fabricated and any other property created hereunder, including all material incorporated therein and all preliminary or other copies thereof (the "Materials") shall become and remain the property of the University, and, unless otherwise specifically set forth herein, shall be considered specially ordered for the University as a "work made for hire," or, if for any reason held not to be a "work for hire," the Contractor who created, produced, developed or fabricated the Materials hereunder assigns all of his/her right, title and interest in the Materials to the University. The University shall own all right, title and interest in the Materials. The Contractor agrees upon request to execute any documents necessary to perfect the transfer of such title to the University. The Materials shall be to the University's satisfaction and are subject to the University's approval. The Contractor bears all risk of loss or damage to the Materials until the University has accepted delivery of the Materials. The University shall be entitled to return, at the Contractor's expense, any Materials which the University deems to be unsatisfactory. On or before completion of the Contractor's services hereunder, the Contractor must furnish the University with valid and adequate releases necessary for the unrestricted use of the Materials for advertising or trade purposes, including model and property releases relating to the Materials and releases from any persons whose names, voices or likenesses are incorporated or used in the Materials. The Contractor hereby

represents and warrants that (a) all applicable laws, rules and regulations have been complied with, (b) the Contractor is free and has full right to enter into this Agreement and perform all of its obligations hereunder, (c) the Materials may be used or reproduced for advertising or trade purposes or any commercial purposes without violating any laws or the rights of any third parties and (d) no third party has any rights in, to, or arising out of, or in connection with the Materials, including without limitation any claims for fees, royalties or other payments. The Contractor agrees to indemnify and hold harmless the University of Central Florida Board of Trustees and those acting for or on its behalf, the State of Florida and the Florida Board of Governors and their respective officers, agents, employees and servants from and against any and all losses, claims, damages, expenses or liabilities of any kind, including court costs and attorneys' fees, resulting from or in any way, directly or indirectly, connected with (a) the performance or non-performance of the University's order by the Contractor, (b) the use or reproduction in any manner, whatsoever, or (c) any breach or alleged breach of any of the Contractor's agreements or representations and warranties herein.

27. PUBLIC RECORDS, CONTRACT FOR SERVICES: COMPLIANCE WITH SECTION 119.0701, F.S.

IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT: Office of the General Counsel, (407) 823-2482, gcounsel@ucf.edu, University of Central Florida, 4365 Andromeda Loop N., Millican Hall, Suite 360, Orlando, FL 32816-0015

PUBLIC RECORDS, CONTRACT FOR SERVICES

To the extent that the Contractor meets the definition of "contractor" under Section 119.0701, Florida Statutes, in addition to other contract requirements provided by law, the Contractor must comply with public records laws, including the following provisions of Section 119.0701, Florida Statutes:

1. Keep and maintain public records required by the public agency to perform the service.
2. Upon request from the public agency's custodian of public records, provide the public agency with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in this chapter or as otherwise provided by law.
3. Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the contract term and following completion of the contract if the contractor does not transfer the records to the public agency.
4. Upon completion of the contract, transfer, at no cost, to the public agency all public records in possession of the contractor or keep and maintain public records required by the public agency to perform the service. If the contractor transfers all public records to the public agency upon completion of the contract, the contractor shall destroy any

duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the contractor keeps and maintains public records upon completion of the contract, the contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the public agency, upon request from the public agency's custodian of public records, in a format that is compatible with the information technology systems of the public agency.

A request to inspect or copy public records relating to a public agency's contract for services must be made directly to the public agency. If the public agency does not possess the requested records, the public agency shall immediately notify the contractor of the request, and the contractor must provide the records to the public agency or allow the records to be inspected or copied within a reasonable time.

If a contractor does not comply with the public agency's request for records, the public agency shall enforce the contract provisions in accordance with the contract.

This Contractor and any subcontractors shall abide by the requirements of 41 CFR §§ 60-1.4(a), 60-300.5(a), 60-741.5(a), and 29 CFR Part 471, Appendix A to Subpart A with respect to affirmative action program and posting requirements. These regulations prohibit discrimination against qualified individuals based on their status as protected veterans or individuals with disabilities and prohibit discrimination against all individuals based on their race, color, religion, sex, sexual orientation, gender, identity, or national origin. Moreover, these regulations require that covered prime contractors and subcontractors take affirmative action to employ and advance in employment individuals without regard to race, color, religion, sexual orientation, gender identity, national origin, protected veteran status, or physical or mental disability.

28. **RECORDS.** The Contractor agrees to keep and maintain separate and independent records, in accordance with generally accepted accounting principles, devoted exclusively to its obligations and activities pursuant to this Agreement. Such records (including books, ledgers, journals, and accounts) shall contain all entries reflecting the business operations under this Agreement. The University or its authorized agent shall have the right to audit and inspect such records from time to time during the term of this Agreement, upon reasonable notice to the Contractor.
29. **TAXES.** The University shall not pay any intangible taxes, property taxes or sales taxes.
30. **VIETNAM ERA VETERANS READJUSTMENT ACT OF 1974.** The University and the Contractor must comply with all applicable provisions of: (i) §402:60-250.4 of the Vietnam Era Veterans Readjustment Act of 1974; (ii) §503:60-741.4 of the Rehabilitation Act of 1973; (iii) Executive Order 11246, as amended; and (iv) the rules, regulations, and relevant orders of the U.S. Secretary of Labor.
31. **EQUAL OPPORTUNITY.** This Contractor and any subcontractors shall abide by the requirements of 41 CFR §§ 60-1.4(a), 60-300.5(a), 60-741.5(a), and 29 CFR Part 471,

Appendix A to Subpart A with respect to affirmative action program and posting requirements. These regulations prohibit discrimination against qualified individuals based on their status as protected veterans or individuals with disabilities and prohibit discrimination against all individuals based on their race, color, religion, sex, sexual orientation, gender identity, or national origin. Moreover, these regulations require that covered prime contractors and subcontractors take affirmative action to employ and advance in employment individuals without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, protected veteran status, or physical or mental disability.

32. **SEVERABILITY.** This Agreement is severable such that should any provision of this Agreement be or become invalid or unenforceable, the remaining provisions shall continue to be fully enforceable.
33. **WAIVER/REMEDIES.** No failure or delay by a party hereto to insist on the strict performance of any term of this Agreement, or to exercise any right or remedy consequent to a breach thereof, shall constitute a waiver of any breach or any subsequent breach of such term. No waiver of any breach hereunder shall affect or alter the remaining terms of this Agreement, but each and every term of this Agreement shall continue in full force and effect with respect to any other then existing or subsequent breach thereof. The remedies provided in this Agreement are cumulative and not exclusive of the remedies provided by law or in equity.
34. **CONTRACTOR INSURANCE.** All insurance shall be procured from companies authorized to do business in the State of Florida, with a minimum of A.M. Best rating of A, or equivalent. Proof of coverage shall be provided by submitting to the University's Risk Management Office a certificate or certificates, evidencing the existence thereof or insurance binders and shall be delivered within fifteen (15) days of the tentative award date of the Agreement. In the event a binder is delivered, it shall be replaced within thirty (30) days by a certificate in lieu thereto. A renewal certificate shall be delivered to the University's Risk Management Office at least thirty (30) days prior to the expiration date of each expiring policy.
 1. The University, at its sole discretion, has the right to deviate from any of the insurance requirements herein. If the University decides to deviate from the insurance requirements stated herein, the University will inform the Contractor in writing.
 2. **General Liability:** The Contractor shall provide a Certificate of Insurance evidencing Commercial General Liability insurance coverage in force with minimum limits of \$1,000,000 (ONE MILLION DOLLARS) per Occurrence and \$2,000,000 (TWO MILLION DOLLARS) Aggregate. Upon acceptance and confirmation of coverage by the University and before beginning work, and at all times during the term of this Agreement, Contractor will maintain said General Liability insurance in force and shall provide the University with a Certificate of Insurance and Additional Insured Endorsement listing the University of Central Florida Board of Trustees as

“Additional Insured.” The Certificate will provide a minimum 30 days advanced notice to in the event of cancellation.

3. **Auto Liability:** If the Contractor operates a vehicle on campus for commercial use in the performance of this Agreement (i.e. deliveries, transport of employees, etc.), the Contractor shall provide a Certificate of Insurance evidencing Auto Liability insurance with minimum \$1,000,000 (ONE MILLION DOLLARS) per Accident Combined Single Limit for Bodily Injury and Property Damage. Upon acceptance and confirmation of coverage by the University and before beginning work, and at all times during the term of this Agreement , the Contractor will maintain said Auto Liability insurance in force and provide University with a Certificate of Insurance listing the University of Central Florida Board of Trustees as “Additional Insured.” The Certificate will provide a minimum 30 days advanced notice to the University in the event of cancellation.
4. **Workers’ Compensation:** The Contractor shall provide a Certificate of Insurance evidencing Workers’ Compensation coverage consistent with Florida Statute and Employer’s liability no less than \$500,000 (FIVE HUNDRED THOUSAND DOLLARS) for Bodily Injury by accident, each accident, Bodily Injury by disease, each employee, and policy limit. Upon acceptance and confirmation of coverage by the University and before beginning work, and at all times during the term of this Agreement , the Contractor will maintain said Workers’ Compensation and Employer’s Liability insurance in force and provide the University with a current Certificate of Insurance. The Certificate will provide a minimum 30 days advanced notice to the University in the event of cancellation.
5. **Certificates of Insurance:** The University of Central Florida Board of Trustees is to be listed as Additional Insured on all Certificates issued. Contractor shall send a copy of his/her Certificate of Insurance along with accompanying Additional Insured Endorsements naming the University of Central Florida Board of Trustees to the following address:

Email: RiskManagement@ucf.edu

35. AMENDMENTS. No changes or amendments to this Agreement are binding on the University unless made in legible writing that is reviewed and approved by an attorney in the University’s General Counsel’s Office and an authorized UCF signatory. The Contractor shall return this Agreement to the University’s Procurement Services Department at once with a written explanation if it is not acceptable in its entirety.

36. USE OF CONTRACT BY OTHER GOVERNMENT AGENCIES. At the option of the Contractor, the use of the Agreement resulting from this solicitation may be extended to other governmental agencies, including the State of Florida, its agencies, political subdivisions, counties and cities. Each governmental agency allowed by the Contractor to use this Agreement shall do so independent of any other governmental entity. Each agency shall be responsible for its own purchases and shall be liable only for goods or services ordered, received and accepted. No agency receives any liability by virtue of this bid and

subsequent contract award.

37. **SECURE HANDLING OF UCF DATA.** The University requires Contractors and other third parties to review, accept, and integrate secure data handling requirements as part of any contract, agreement, or Service Level Agreement (“SLA”) that involves the storage, transmission, processing, or collection of UCF data, or access to UCF data, by the Contractor. Additional agreements may be required depending on the data involved. This Agreement is intended to ensure that UCF’s security and compliance requirements are outlined and followed by the Contractor. Visit <http://www.Infosec.ucf.edu/vrm> for additional information.
38. **SMOKE-FREE POLICY.** The University prohibits smoking on all university owned, operated, leased and/or controlled properties in order to maintain a healthy and safe environment for its faculty, staff, students, and visitors. Visit <http://www.ucf.edu/smokefree> for additional information.
39. **CONTACT WITH MINOR CHILDREN.** To the extent that the Contractor has or will have any contact with minor children, the Contractor hereby guarantees that the Contractor and/or anyone acting on the Contractor’s behalf (including, but not limited to the Contractor’s employees, agents, subcontractors, etc.) has undergone/passed a Level II (two) background check with the State of Florida and hereby certifies that none of the Contractor’s employees, agents, subcontractors and/or anyone else acting on the Contractor’s behalf has any disqualifying offenses, including, but not limited to those listed in Section 435.04, Florida Statutes.
40. **REPORTING OF CHILD ABUSE.** To the extent that the Contractor has or will have any contact with minor children, the Contractor hereby expressly agrees to instruct its employees, agents, subcontractors and/or anyone else acting on the Contractor’s behalf to report to the University of Central Florida police any instance of child abuse, abandonment, or neglect witnessed or learned about that occurred on University of Central Florida property or during an event or function sponsored by the University of Central Florida.
41. **REVISED QUANTITIES.** The University reserves the right to increase or decrease total quantities as necessary. The University may place additional orders for the same or modified scope of the commodities/services solicited under this ITB/ITN within 180 days after expiration of the contract resulting from this ITB/ITN. Total additional quantities/modified scope, if any, are unknown.
42. **E-VERIFY.** All terms defined in §448.095, Fla. Stat., are adopted and incorporated into this provision. Pursuant to §448.095, Fla. Stat., Vendor certifies that it is registered with and uses the U.S. Department of Homeland Security's E-Verify system to verify the US employment eligibility of all of Vendor's employees hired by the Vendor during the term of this Agreement and/or while performing work or providing services for UCF. Vendor shall require that all subcontractors performing work or providing services on behalf of Vendor for UCF also comply with the requirements of §448.095, Fla. Stat and utilize the E-Verify system to verify US employment eligibility of all employees hired by subcontractor. The

Vendor shall require for the subcontractor to provide to Vendor an affidavit stating that the subcontractor does not employ, contract with or subcontract with an unauthorized alien. Vendor shall maintain a copy of such affidavit for the duration of the Agreement. UCF may terminate this Agreement immediately upon notice to Vendor for any violation of this provision. A Vendor whose contract is terminated pursuant to this paragraph is liable for additional costs incurred by UCF due to the termination of the Agreement. Section 448.095, Florida Statutes, shall be interpreted consistently with applicable federal laws or regulations. If there are new regulatory pronouncements or guidances or statutory requirements regarding, or judicial interpretations of, Section 448.095, Florida Statutes, during the term of this [contract] the parties agree to update this clause so that it complies with such pronouncements, requirements and interpretations.

**E-Verify Alternative Clause
Contractors Who Are Public Employers**

To the extent that you qualify as a Public Employer as defined by Section 448.095, F.S., in lieu of the E-Verify section above, the following paragraph will apply to you:

Florida E-Verify Law; Section 448.095, Florida Statutes. [You] represent and warrant to [UCF] that [you] are registered with and using the E-Verify systems to verify the US work authorization status of all newly hired employees and covenant to continue to do so throughout the term of this [contract]. [You] further covenant to comply with the other applicable requirements of Section 448.095, Florida Statutes.

- 43. ATTACHMENTS AND ENTIRE AGREEMENT.** This Agreement and any attachments and/or addenda hereto that are executed by the University's duly authorized signatory constitute the entire and exclusive agreement between the parties. Attachments and/or addenda may include, but are not limited to, the University's ITB/ITN, if any, including all the University's ITB/ITN specifications, and the Contractor's ITB/ITN response, if applicable. In the event of any conflict or inconsistency between this Agreement and the provisions of attached documents, the order of priority is:
- A.** This Agreement;
 - B.** The University's ITB/ITN and ITB/ITN specifications, if any;
 - C.** The Contractor's ITB/ITN response; and
 - D.** Any other attached documents signed by the University's official signatory at the time the Agreement is executed.

**UNIVERSITY OF CENTRAL FLORIDA BOARD
OF TRUSTEES**

CRYOELEC LLC

Signature: _____

Signature: _____

Date: _____

Date: _____

Printed: Brian Sargent

Printed: _____

Title: Manager, Procurement Services

Title: _____

ATTACHMENT "A" PRICE SCHEDULE

In accordance with the University of Central Florida's ITN/ITB No. **2021-08TCSA** and the Contractor's response.

Pricing/ Cost:

Below is a fixed fee quote including hardware and labor cost. Labor will be performed off-site (design, assembly, testing) and on-site (system deployment, testing, integration...).

The engineer assigned to the project (Hamdi Mani) will provide all needed services at the rate of: \$80/ hour

QUOTE # 14



CryoElec LLC
 Hamdi Mani
 809 W Bentrup St
 Chandler, AZ 85225
 (626) 676-0143
info@CryoElec.com

Quote #14

BILL TO

Arecibo Observatory

SHIP TO

Arecibo Observatory

Quote Date:

11/10/2021

LINE ITEM #	DESCRIPTION OF PRODUCTS AND SERVICES	QTY	UNIT PRICE	TOTAL
1	Phase I: Labor cost (Design, assembly and testing including on-site work) : \$20,324.94 Parts/Hardware Cost: \$24,000 Hardware includes: Feed + 1 x LNA + filter + Misc Duration: 5 weeks (off-site:2 weeks , on-site: 3 weeks)	1	\$44,324.94	\$44,324.94
2	Phase II: Labor cost (Design, assembly and testing including on-site work) :27 weeks @ 86,400 + travel @ 4,324.94 = 90,724.94 Parts/Hardware Cost: 58,797.25 Hardware includes: - A fully integrated, custom made, cryogenic system: high vacuum chamber with a large microwave transparent window cooled with the Trillium 350 cold head, including all internal and external components: vacuum flanges, connectors (RF + DC), temperature sensors, vacuum gauge, vacuum valve and power supplies. - A wideband feed 2-14 GHz, dual linear Polarized, with a 20dB taper at HPBW angle 45deg or 60deg - 2-14GHz cryogenic LNAs (quantity =2 pcs) - Custom noise Injection circuitry: Cryogenic low loss wideband coupler connected to temperature stabilized (room temp or cooled) Low power (4 to 5% of average Tsys ~ 1K) and high power (40 to 50% of average Tsys~ 10K) noise sources switchable at 80Hz - Custom 2GHz Cryogenic Filters - Room temperature electronics: Switches, post amplifiers, variable attenuators, power splitters, combiners and custom made filters -A Solar filter: Aperture filter with ~20dB attenuation for solar observation: with a mechanical drive and control electronics - A M&C system for the RF electronics and cryogenics: Monitor temperatures (1st and 2nd Stages) , pressure, LNA voltages and currents. Control noise sources (constant current sources), switches and attenuators. Including power supplies. Duration: 27 weeks (off-site: 24 weeks, on-site: 3 weeks)	1	\$149,522.19	\$149,522.19

SUBTOTAL 193847.13

Thank you for considering CryoElec LLC as a supplier for your RF/Microwave cryogenic electronics needs. We are pleased to quote your requirements as shown above and we look forward to the opportunity of serving you.

TAX RATE	0.00%
TOTAL TAX	0.00
SHIPPING	0.00
TOTAL	\$ 193,847.13

Terms & Instructions

A PO needs to be issued to place an order.
 An invoice will be sent to the customer during shipping products and/or services

ATTACHMENT “B” SCOPE OF WORK

Section C: Project Approach

This section identifies the tasks, the deliverables and a timeline required to complete the project as well as technical details about implementation. Over the course of the project, CryoElec LLC will be responsible for the following tasks:

- On-site / On-antenna testing of a room temperature prototype QRFH Front-End
- Hardware Design and Analysis
- Hardware Procurement
- Hardware Assembly
- Hardware Testing
- Generate documentation
- Sending progress reports and updates regularly
- Attending meetings and design reviews (online)
- Responding to reviews and making revisions if needed
- Reporting problems or issues affecting: schedule, budget or performance
- On-site / On-antenna testing of final product

C1. Deliverable:

- Complete Cryogenic Front-end system with integrated noise and phase calibration: Dual linear polarized QRFH Feed covering 2-14GHz.
- A Solar filter/attenuator assembly mechanically and electrically integrated with the front-end
- Cryogenic RFI rejection high pass filters (quantity =2)
- Room temperature electronics: filtering, variable attenuation and additional gain stages
- M&C electronics: controls all cryogenic and room temperature sub-systems, monitors temperatures, pressure, voltages and currents through an Ethernet interface
- Documentation: including drawings, operation/user manual and Ethernet interface programming manual.
- On-site system installation, customer training and hand over to local engineering team

C2. Technical Details / Implementation:

- **General description of the Front-end system:** The cryogenic wideband front-end is the first and most critical element of a radio astronomy system. It is the part of the system that defines sensitivity and is mounted on the focal point of the 12m antenna. The front-end will provide high gain (>30dB) and low noise temperature (~20K) and is being integrated inside a cryostat (a vacuum chamber) which is cooled to 10 Kelvin using a closed cycle refrigerator. The key components of the front end are: the feed, the LNA, the vacuum vessel and the cryogenic cooler. It is succeeded by a room temperature receiver providing additional signal amplification and conditioning (filtering, attenuation...) and then by a digital signal processing back end.
- **The Feed:** The QRFH feed is a high performance horn antenna and an ideal feed for radio telescopes as it has excellent return loss, very uniform radiation pattern and low insertion loss over a wide band. In addition to that, this feed can be easily cryogenically cooled as it has low thermal resistance. There are 2 versions/designs of the QRFH feed available to use for this project. The Arecibo team needs to specify which one is preferred based on the 12m antenna geometry (antenna details not available to CryoElec LLC to make a decision): Version 1: A 60 degree half angle at -20dB and Version 2: A 45 degree half angle at -20dB. This feed has been designed at Caltech and CryoElec LLC obtained authorization to manufacture the design for this proposal.
- **The LNA:** The highest performance (lowest noise temperature) will be obtained using MMIC LNAs based on the Caltech design, fabricated and tested by Cosmic Microwave technology model CIT1-12 (www.cosmicmicrowavetechnology.com)
- **The cryostat:** A cylindrical cryostat machined in aluminum for lower cost and weight. All Cryostat parts will be custom designed and made. All seals will be O-ring seals made with Viton material. A large (10-13in diameter) window will provide a microwave transparent vacuum barrier.
- **Sensitivity Spec / Noise Temperature:** A receiver noise temperature of 20- 25K or lower has been achieved in previous systems built by the author of the proposal (Appendix A). The critical components contributing to the receiver noise temperatures are: the cryogenic low noise amplifier (5 Kelvin) and all components located in front of it (between the LNA and the feed) including: The insertion loss of: the noise injection coupler, the RFI rejection high pass filter, the feed, the thermal blanket (used to reduce heat load) and the window material used to provide a vacuum barrier. These losses will be minimized by a combination of: good design and proper selection of the lowest loss components. In addition to that, the physical temperature of these components will be minimized by proper thermal/cryogenic design reducing heat load (radiative, convective and radiative loads) to a minimum. CryoElec LLC will guarantee the receiver noise temperature (T_{rec}) to be < 30K, but cannot guarantee the system noise temperature (T_{sys}) as the antenna geometry/details are not available and not controlled by CryoElec LLC. The system noise temperature T_{sys} will be affected by the spill over noise caused by the optics. This spill over noise (in addition to antenna aperture efficiency) will be measured during Phase of the project.
- **Mechanical consideration and integration with the Arecibo 12m antenna:** The cryostat design will be made to fit inside the antenna receiver cone. Mounting hardware will be designed and fabricated based on drawings provided by the Arecibo team and detailed drawings made on-

site during the Phase I visit. Drawings of 2 concept cryostat designs have been generated and are attached to the proposal. Both concepts will fit inside the receiver cone and both have mounting plates/hardware allowing easy (and manually adjustable) mounting inside the cone. One of these concepts will be chosen just after the completion of Phase I (on site visit).

- Noise calibration sources: The noise sources will be custom made for this front-end. They will be based on commercial of the shelf noise diodes used and proven in previous designs to be reliable and stable. These noise sources will be mounted inside the cryostat at the 1st stage (60K) plate providing a very stable temperature. The noise sources will be biased with a constant current source (custom made), located outside the cryostat inside the M&C system. The bias current source will be controlled (ON / OFF) using 2 digital lines from the M&C system. A solid state switch (based on pin diode or FET) will be made to turn on/off the noise cal at high rate (up to 100Hz). The noise sources hardware will be identical but biased at different currents providing 2 noise levels: 5% T_{sys} (~2K) and 40% T_{sys} (~16K).
- Monitor and control (M&C) system: The M&C will provide the following functions:
 - DC Power supplies to power the LNAs (constant voltage bias) and noise calibration source (constant current bias) as well as power to the temperature diodes (constant current) and other room temperature components (amplifiers, switches, attenuators...)
 - Digital control lines for: the noise calibration, the switches, the step attenuator, the solar attenuator mechanism
 - Analog input lines: to monitor temperatures, pressure, voltages and currents
 - An Ethernet interface with a manually or DHCP assigned IP address through which the customer software interfaces to (A programming guide of the Ethernet interface will be provided as part of the documentation)
- Solar Attenuator: This aperture attenuator will have about 20dB of attenuation and will be implemented using a thin piece of absorber material (carbon loaded foam absorber) .The attenuator will be mounted inside a mechanically steerable flange, controlled with the M&C system.
- The room temperature receiver section: This sub-system contains additional gain stages with high linearity (P1dB and IP3) and custom made filters covering the bands: 2.3-5GHz and 4-14GHz as well as other signal conditioning components: variable attenuation and power splitters/combiners. The digital step attenuators (DSA) will be controlled through their SPI (serial peripheral interface) digital interface communicating with the M&C system. The noise temperature of this receiver will be chosen such that its contribution to the overall noise temperature is < 0.5K. This receiver will be housed inside a weather proof and RFI tight enclosure mounted inside the antenna cone close to the front end.

Figure 1. Block Diagram of Proposed System (CryoElec LLC)

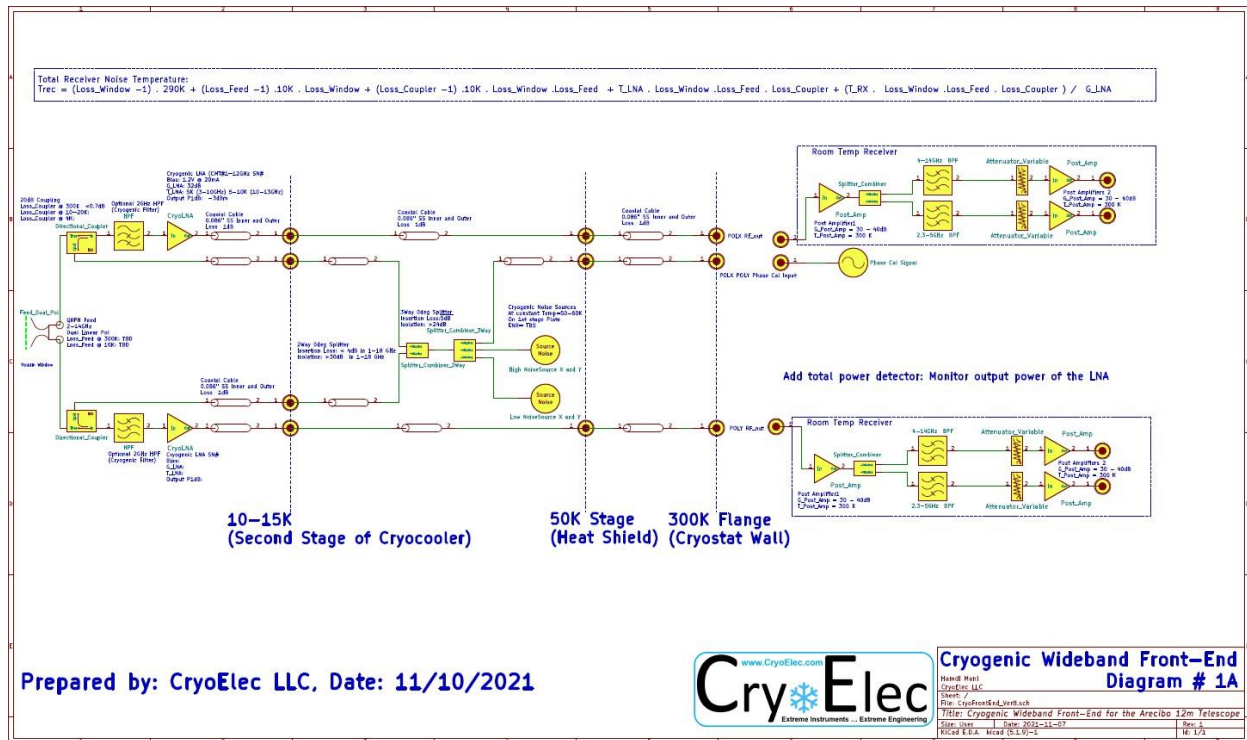
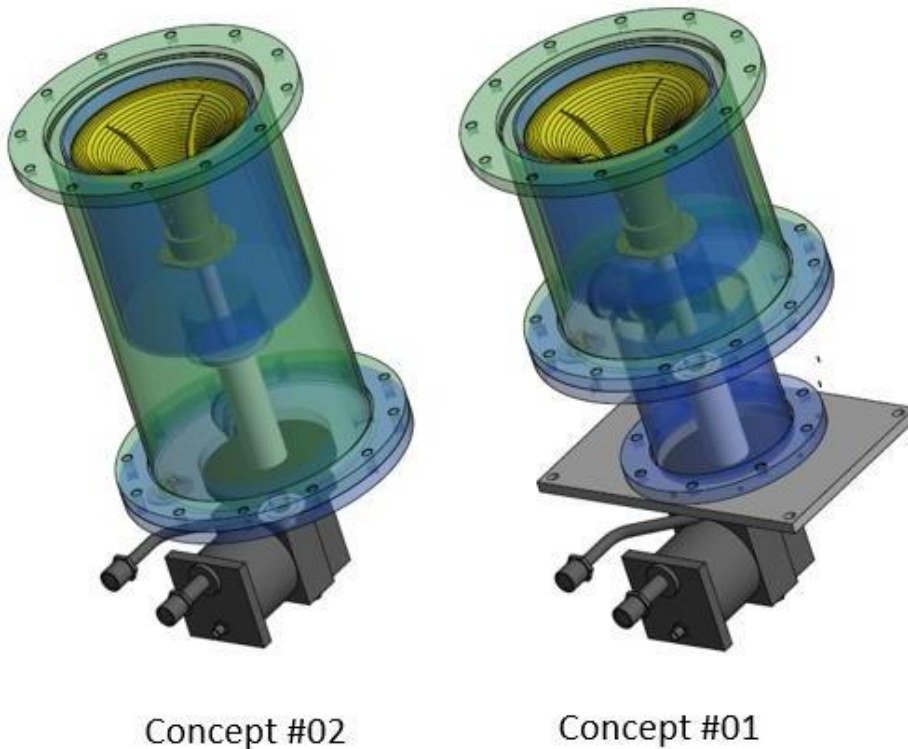
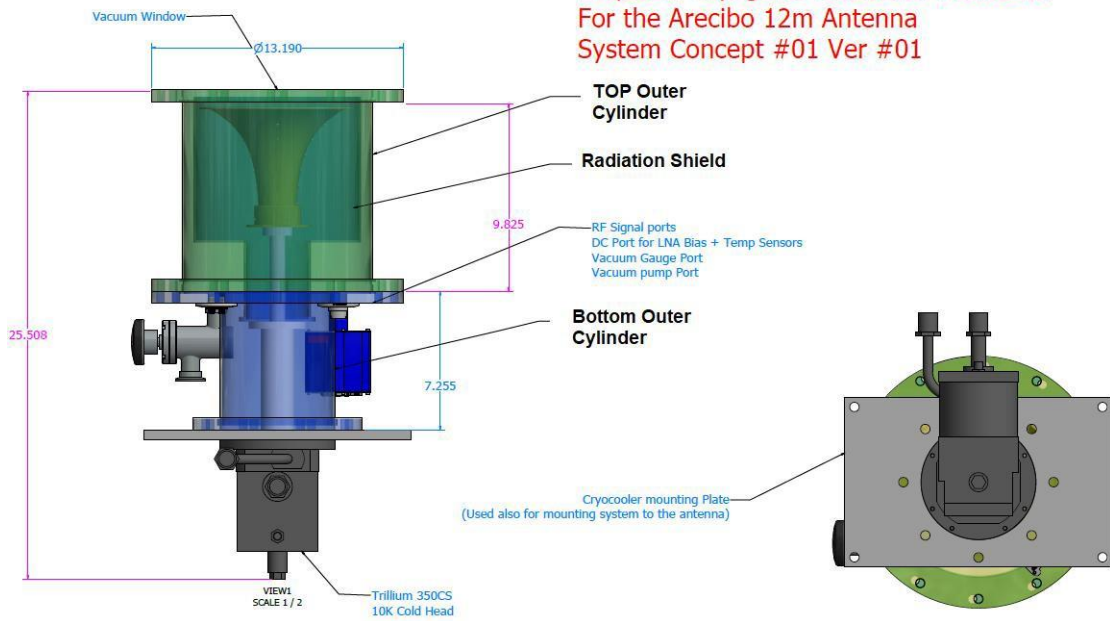


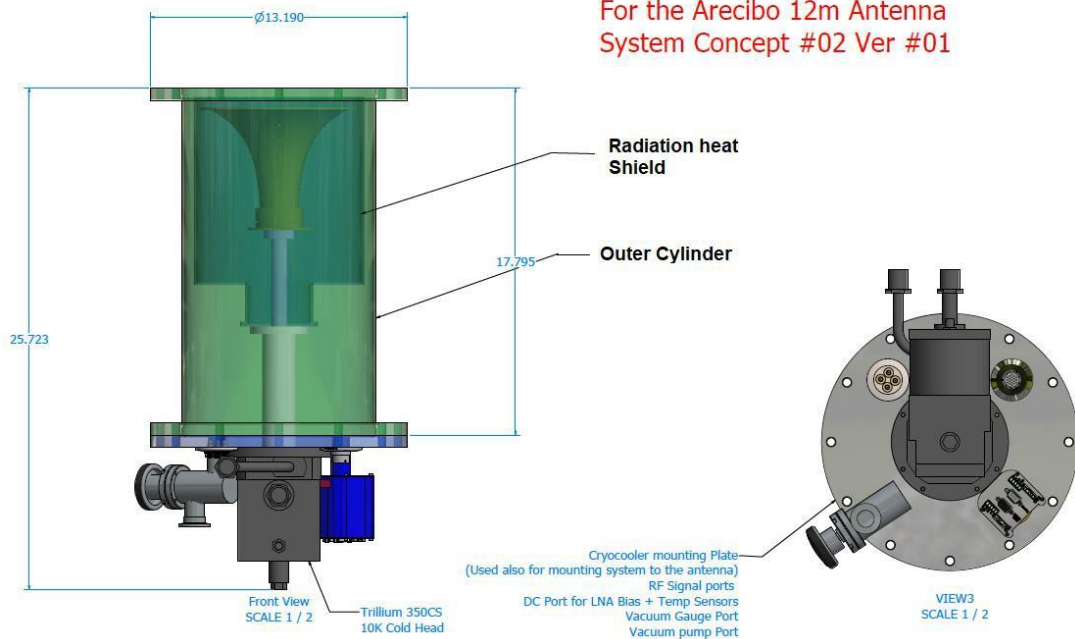
Figure 2. Drawings of 2 concept cryostats



Proposed Cryogenic Wideband Front-End
For the Arecibo 12m Antenna
System Concept #01 Ver #01



Proposed Cryogenic Wideband Front-End
For the Arecibo 12m Antenna
System Concept #02 Ver #01



C3. Project Schedule, Milestones and Timeline

Phase 1: On-site testing of a room temperature Prototype Front-End

Phase 1.1: Build and test a room temperature prototype QRFH feed front-end for initial on-site / on-antenna testing of the QRFH feed / 12m antenna combination

- Acquire the required hardware to build a simplified room temperature front-end including:
 - QRFH Feed 60deg HPBW
 - Wideband Low noise amplifier (2-14GHz)
 - High pass filter: Cut off frequency in the 2-3GHz band
 - Total power detector (covering 2-14GHz and
- Build the room temperature front end feed + LNA and do an off-site test: Y-factor noise temperature of the front end, linearity measurements (P1dB)
- Create a detailed plan for the on-site visit: detailed testing plan with goals. Coordinate with local Arecibo team.

Phase 1.1 duration: ~ 2 weeks @ full time

Phase 1.2: On antenna testing of the QRFH feed / Room temperature front end.

During this Phase, the following tasks are performed:

- On-site, off-antenna testing of the front end (receiver noise Trec)
- Installation of the QRFH feed front-end on the 12m antenna
- Measurement of the noise temperature of the system (Tsys) on antenna at zenith (minimum spill over noise contribution) and at different elevation angles (generate a “tipping” curve”)
- The difference of receiver noise Trec measured off-antenna and Tsys measured on-antenna is a measurement of the spill over noise.
- Measurement of the aperture efficiency using known astronomical radio sources (the antenna will be moved and will need to track radio stars)
- RFI survey on the 2-14GHz band: Off-antenna and on-antenna (at different elevation angles) over at least 24 hours: This will determine the cut-off frequency of an optional RFI rejecting cryogenic high pass filter

- Generate drawings of hardware inside the antenna cone: This will help designing the mounting plate of the cryostat.

Phase 1.2 duration: ~ 3 weeks @ full time

Phase 2: Design, manufacturing and testing of the cryogenic system

Phase 2.1: Cryogenic Design, Analysis and Procurement

During this Phase, the following tasks are performed:

- Cryogenic System Design: Mechanical, thermal and Electrical design
- Parts and Key components are selected
- Design Review
- Design Revision if needed
- Procurement of parts and Materials after design acceptance

Phase 2.1 duration: ~ 1 Month @ full time

Phase 2.2: Solar Filter/attenuator design + calibration noise sources design

During this Phase, the following tasks are performed:

- Solar Filter: Mechanical design
- Solar Filter: Control Electronics Design
- Electronics and mechanical design of the 2 calibration noise sources (low cal and high cal)
- Design Review
- Design Revision if needed
- Procurement of parts and Materials after design acceptance

Phase 2.2 duration: ~ 1 Month @ full time

Phase 2.3: M&C System Design

During this Phase, the following tasks are performed:

- M&C System Design: Electronic Design

- Parts and Key components are selected
- Design Review
- Design Revision if needed
- Procurement of parts and Materials after design acceptance

Phase 2.3 duration: ~ 1 Month @ full time

Phase 2.4: System Assembly

During this Phase, the following tasks are performed:

- Mechanical Assembly of the Vacuum Chamber / Cryogenic system
- Installation of electronic components
- RF Cabling installation
- DC Wiring
- Connection to M&C system

Phase 2.4 duration: ~ 1 Month @ full time

Phase 2.5: System Testing

During this Phase, the following tasks are performed:

- Vacuum test of the cryostat
- Cryogenic test: Heat load on the cryogenic cooler test
- Electronics components testing
- M&C system Testing
- Vacuum Window Test
- RF Tests: Noise temperature Measurements of the Front end
- RF Tests: Adjustment/Calibration of the noise cal sources.

Phase 2.5 duration: ~ 1 Month @ full time

Phase 2.6: Integration with Room Temperature Electronics and Testing

During this Phase, the following tasks are performed:

- Integrating the Cryogenic front end package with the room temperature electronics.
- Testing of the full system

Phase 2.6 duration: ~ 2 Weeks @ full time

Phase 2.7: Documentation

During this Phase, the following tasks are performed:

- Gathering and combining all design files + Drawings + Test data in one User/Maintenance Manual
- Writing a Standard Operating Procedure (SOP)

Phase 2.7 duration: ~ 2 Weeks @ full time

Phase 2.8: Field Deployment and on-Antenna Testing

During this Phase, the following tasks are performed

- Installation of the system on customer site
- Conducting On-site on-antenna testing
- Training customer personnel on operating the system

Phase 2.8 duration: ~ 3Weeks @ full time

Total Duration of the Project: 32 Weeks