NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER (MSFC)
JUSTIFICATION FOR OTHER THAN FULL AND OPEN COMPETITION
(JOFOC)
For Super-High Energy Replicated Optics (SuperHERO)

1. **Federal Acquisition Regulation (FAR) 6.104-1(a)(1) – Identification of the agency and the contracting activity, and specific identification of the document as a "Justification for other than full and open competition."**

   This document is a justification for other than full and open competition prepared by the National Aeronautics and Space Administration (NASA) George C. Marshall Space Flight Center (MSFC).

   The procuring agency is NASA and the contracting activity is MSFC.

2. **FAR 6.104-1(a)(2) – The nature and/or description of the action being approved:**

   This justification provides the rationale for contracting by other than full and open competition to award a sole-source contract to Washington University in St. Louis (WashU) 80MSFC26C0010, for the design and testing of a truss/optical bench to be used on the Super-High Energy Replicated Optics (SuperHERO) balloon mission; this mission was awarded as part of the Research Opportunities in Space and Earth Science-2023 (ROSES-2023) NASA Research Announcement (NRA) Number NNH23ZDA001N, Appendix D.3 Astrophysics Research And Analysis Program (APRA).

   On June 12, 2024, the Associate Director for Research, NASA Headquarters, and Astrophysics Division, informed NASA/MSFC that its SuperHERO Hard-X-ray Telescope proposal effort, led by Dr. Nicholas Thomas (Principal Investigator), had been selected through the competitive process identified within the Announcement of Opportunity. The SuperHERO effort is led by NASA/MSFC, while the team members identified within its proposal submission include the following: University of Alabama Huntsville; WashU in St. Louis; University of New Hampshire (UNH); Universities Space Research Association; Middlebury College; Columbia Astrophysics Laboratory; Kavli Institute for the Physics and Mathematics of the Universe (Kavli IPMU) – The University of Tokyo; and Japan Aerospace Exploration Agency (JAXA)

3. **FAR 6.104-1(a)(3) – A description of the supplies or services required, to meet the Agency's needs (including the estimated value):**

   SuperHERO is a high-angular-resolution, balloon-borne, hard-X-ray observatory and is the successor to NASA/MSFC's successful HERO and HEROES missions. SuperHERO will implement recent advancements in MSFC's replicated nickel shell optics technology to achieve its goal of better than 10 arcsecond-angular-resolution performance in the hard-X-ray (>20 keV) regime. This will allow SuperHERO to achieve its initial science objective of observing the Crab Nebula with unprecedented detail in this bandpass. The SuperHERO

mission will fly in the fall of 2029 from Fort Sumer, New Mexico.

This action supports: 1) the design of a 12-meter truss/optical bench similar-to that of the XL-Calibur telescope to accommodate a higher mirror mass, 2) conducting experimental carbon fiber-aluminum joint pull tests aimed at demonstrating their maximum load limits, 3) fabricating the 12-meter truss/optical bench and perform load-deformation tests at the contractor's facility, 4) transporting the truss/optical bench to Wallops Flight Facility and participate in required hang testing, and 5) participating in SuperHERO's scientific mission, including support for data and science analysis, meeting/review participation.

The period of performance is estimated to be from the date of award through December 31, 2030, and the estimated dollar value is $1,004,621.

4. **FAR 6.104-1(a)(4) – An identification of the statutory authority permitting other than full and open competition:**

The statutory authority permitting other than full and open competition is 10 U.S.C. § 3204(a)1 as implemented by FAR 6.103-1, Only one responsible source and no other supplies or services will satisfy agency requirements.

5. **FAR 6.104-1(a)(5) – A demonstration that the proposed contractor's unique qualifications or the nature of the acquisition requires use of the authority cited:**

The rationale supporting the use of 10 U.S.C. § 3204(a)1 is there is only one responsible source, and no other supplies or services will satisfy agency requirements as described below.

The SuperHERO balloon-borne telescope is a hard-X-ray observatory that will utilize MSFC replicated shell technology to demonstrate better than an order-of- magnitude improvement in angular resolution to the current state-of-the-art. Competed as part of the ROSES-23 NRA Number NNH23ZDA001N Appendix D.3 APRA, SuperHERO will encounter mechanical and thermal extremes unique to the stratospheric science balloon environment. SuperHERO's technical requirements necessitate that the optical bench be rigidly fixed and balanced 12 meters away from its focal plane with limited (~1 mm) flexing as the observatory raises and lowers its elevation. The super-structure linking the optical bench to the detector plane must also be robust enough to accommodate the respective masses of the optics and detectors and have a negligible coefficient of thermal expansion. The structure itself must also have a minimal mass to meet balloon lift requirements to

Figure 1 The XL-Calibur balloon telescope. A similar composite carbon fiber truss, uniquely developed by WashU, will provide the stability for SuperHERO's high-angular resolution requirements.

ensure that it attains a float altitude of 130,000 feet (~40 km). This unique scenario was previously addressed by WashU during the design and fabrication of XL-Calibur. With a similar mass and focal length requirements to SuperHERO, XL-Calibur has made multiple successful long-duration balloon flights. By employing a composite carbon fiber truss design based on WashU's architecture, the SuperHERO mission will limit the risk associated with a brand new truss structure design and reduce the potential additional cost of a completely redesigned assembly. Furthermore, WashU's personnel's extensive experience in science balloon flights will be leveraged to further ensure the success of the SuperHERO mission.

For the work to be completed by the flight in the Fall of 2029, the introduction of a new contractors without these unique capabilities would introduce serious risks to schedule and delivery of an operational system to NASA stakeholders. An estimated 12-24 month schedule delay would be incurred should another contractor be chosen.

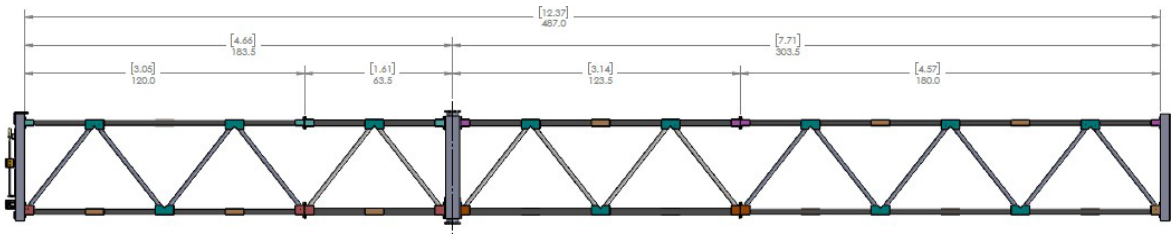

Figure 2 SuperHERO's Draft Composite Carbon Fiber Truss Design. By implementing a flight proven truss design, programmatic cost and risk is limited.

6. **<u>FAR 6.104-1(a)(6) – A description of the efforts made to ensure that offers are solicited from as many potential sources as practicable, including whether a notice was or will be publicized as required by Subpart 5.1 and, if not, which exception under part 5.101 applies:</u>**

A notice to the Government Point of Entry (GPE) website (Sam.gov) was published on March 26, 2025, in accordance with FAR part 5. This posting informed potential sources of NASA's intent to award this sole-source contract to WashU. The results of this synopsis are summarized in Section 10 below.

7. **<u>FAR 6.104-1(a)(7) – A determination by the contracting officer that the anticipated cost to the Government will be fair and reasonable:</u>**

The contracting officer's signature on this document indicates that the contracting officer has determined that the anticipated cost to the government will be fair and reasonable. The contractor must be required to submit a proposal to be evaluated and negotiated by the Government. Prior to execution of the contractual instrument, a proposal analysis will be performed. The proposal analysis will ensure that the final agreed-to price for the contract action is fair and reasonable.

The Contracting Officer will assess the contractor's proposal utilizing cost and price analysis techniques in accordance with the Federal Acquisition Regulation (FAR) 15.404-1 to determine a fair and reasonable price. Assistance from the MSFC Pricing Team, the Defense

Contract Management Agency (DCMA), the Defense Contract Audit Agency (DCAA), and other independent auditors will be utilized as appropriate to analyze, evaluate, and negotiate based on detailed cost or pricing data.

8. **FAR 6.104-1(a)(8) – Description of the market research conducted, and the results, or a statement of the reason market research was not conducted (e.g., urgent, and compelling requirement):**

   In accordance with FAR 8.002(a)(2), a search was performed via the mandatory source AbilityOne.gov Procurement List with no availability. A review of the Office of Procurement Strategic Sourcing Website was performed yielding no solutions for the SuperHERO requirements. Other sources were reviewed via GSA eLibrary, and other Government contracts. Additional review of existing NASA contracts, per NFS 1808.004, that provide the required services has been conducted and none were suitable for this requirement.

   The scientific ballooning industry is a highly specialized field with a limited number of players. According to NASA industry experts, there are currently no known commercial vendors offering a truss of this size for scientific balloon applications. Washington University in St. Louis (WashU) was selected as the provider of the open-truss carbon-composite truss design required for the SuperHERO mission proposal because of its extensive experience and expertise in the development of a similar carbon-composite truss for the XL-Calibur. Both XL-Calibur and the forthcoming SuperHERO mission are balloon-borne, x-ray telescopes that uniquely have a 12-meter focal length with similar instrument masses. Additionally, WashU's institutional knowledge meeting NASA's Balloon Program Office's technical requirements for a balloon flight mission help ensure the SuperHERO mission meets the unique challenges inherent to exospheric science operations. Furthermore, the inclusion of a university met the APRA requirement to include graduate students as part of the project.

9. **FAR 6.104-1(a)(9) – Any other facts supporting the use of other than full and open competition:**

   In 2023, the Marshall Space Flight Center (MSFC) Advanced Concepts Office undertook a comprehensive assessment regarding the design and associated costs for the development of the SuperHERO project. Utilizing parametric modeling methodologies, the study established an estimated cost range for the truss development between $2.45 million and $4.17 million. Separately, it has been determined that identifying an alternative vendor and addressing the requisite learning curve associated with the fabrication of such a specialized structure would likely result in a delay of 12 to 24 months. Such a delay would jeopardize the ability to adhere to the established launch schedule, and the additional expenses incurred by engaging a new vendor would surpass the project's allocated budget for the truss.

10. **FAR 6.104-1(a)(10) – A listing of the sources, if any, that expressed an interest in writing in the acquisition:**

A notice of NASA's intent to award this sole-source action was synopsized on the GPE website (Sam.gov) on March 26, 2025, per FAR Subpart 5.2 (See Section 6 above). Responses were due by April 10, 2025. No capability statements were received from interested parties, therefore no respondent other than WashU was found to have the capabilities to fulfill all of the SuperHERO requirements.

11. FAR 6.104-1(a)(11) – A statement of actions, if any, the agency may take to remove or overcome any barriers to competition before any subsequent acquisition for the supplies or services required:

The Agency will continue to examine the market in the future for alternative solutions or new sources before executing any subsequent acquisitions for the same requirements.

SuperHERO
JUSTIFICATION FOR OTHER THAN FULL AND OPEN COMPETITION
SIGNATURE PAGE

I certify that the facts presented in this justification are accurate and complete.

Anthony Guillory
Digitally signed by Anthony Guillory
Date: 2026.04.30 13:13:10 -05'00'

Anthony R. Guillory
Technical Representative

I hereby certify that the above justification is complete and accurate to the best of my knowledge and belief.

Bradley Vest
Digitally signed by Bradley Vest
Date: 2026.04.30 13:09:18 -05'00'

Bradley Vest
Contracting Officer

APPROVED:

Adrian Clayton
Digitally signed by Adrian Clayton
Date: 2026.05.05 08:33:05 -05'00'

Adrian D. Clayton
Acting Competition Advocate
MSFC