

AEROSPACE

★ ★ ★ AMERICA ★ ★ ★

APRIL 2024,
VOL. 62, NO. 4

EDITOR-IN-CHIEF
Ben Iannotta
beni@aiaa.org

ASSOCIATE EDITOR
Cat Hofacker
catherineh@aiaa.org

STAFF REPORTER
Paul Brinkmann
paulb@aiaa.org

EDITOR, AIAA BULLETIN
Christine Williams
christinew@aiaa.org

CONTRIBUTING WRITERS
Keith Button, Jonathan Coopersmith,
Moriba Jah, Aaron Karp, Jon Kelvey, Paul Marks,
Jonathan O'Callaghan, Robert van der Linden,
Debra Werner, Frank H. Winter

Laura McGill **AIAA PRESIDENT**
Daniel L. Dumbacher **PUBLISHER**
Rodger Williams **DEPUTY PUBLISHER**

ADVERTISING
advertising@aiaa.org

ART DIRECTION AND DESIGN
THOR Design Studio | thor.design

MANUFACTURING AND DISTRIBUTION
Association Vision | associationvision.com

LETTERS
letters@aerospaceamerica.org

CORRESPONDENCE
Ben Iannotta, beni@aiaa.org

Aerospace America (ISSN 0740-722X) is published monthly except in August by the American Institute of Aeronautics and Astronautics Inc., at 12700 Sunrise Valley Drive, Suite 200 Reston, VA 20191-5807 [703-264-7500]. Subscription rate is 50% of dues for AIAA members (and is not deductible therefrom). Nonmember subscription price: U.S., \$200; foreign, \$220. Single copies \$25 each. Postmaster: Send address changes and subscription orders to Aerospace America, American Institute of Aeronautics and Astronautics, at 12700 Sunrise Valley Drive, Reston, VA, 20191-5807, Attn: A.I.A.A. Customer Service. Periodical postage paid at Reston, Virginia, and at additional mailing offices. Copyright 2024 by the American Institute of Aeronautics and Astronautics Inc., all rights reserved. The name Aerospace America is registered by the AIAA in the U.S. Patent and Trademark Office.



IN THIS ISSUE



Keith Button

Keith has written for C4ISR Journal and Hedge Fund Alert, where he broke news of the 2007 Bear Stearns hedge fund blowup that kicked off the global credit crisis. He is based in New York. [PAGES 16, 30](#)



Moriba Jah

Moriba is a space environmentalist, associate professor at the University of Texas at Austin and chief scientist at Privateer. He helped navigate spacecraft at NASA's Jet Propulsion Lab and researched space situational awareness issues at the U.S. Air Force Research Laboratory. [PAGE 64](#)



Jon Kelvey

Jon previously covered space for The Independent in the U.K. His work has appeared in Air and Space Smithsonian, Slate and The Washington Post. He is based in Maryland. [PAGE 38](#)



Hope Hodge Seck

Hope is a freelance reporter and editor based in Washington, D.C., who has covered U.S. national defense since 2009. A former managing editor of Military.com, her work has appeared in The Washington Post, Popular Mechanics and Politico Magazine, among other publications. [PAGE 22](#)

DEPARTMENTS

- 4 Editor's Notebook
- 7 Flight Path
- 10 Q&A
- 47 AIAA Bulletin
- 62 Looking Back



AD INDEX

KBR.....	5
Thor Studio.....	5

8
AeroPuzzler
Baseball on the moon

9
R&D
Putting Starship's plasma
in historical perspective

16
**Engineering
Notebook**
A new manufacturing
process for thermal
tiles

64
Jahniverse
NASA should update its
approach to astronaut
recruitment



SpaceX

Putting Starship's plasma in perspective

The millions who watched the Starship test flight online last month witnessed a well-known phenomenon in a new way.

As the vehicle dug into the atmosphere base first, a glow appeared and began to grow. It was plasma, a mix of electrons and ions created as Starship plowed into the atmosphere at 8 kilometers per second, generating enormous heat that broke molecules apart and ripped electrons from their atoms.

Plasma forming around a spacecraft on the way home is nothing new. It was the view that captivated viewers, among them space historians.

"There's never been live footage of plasma completely enveloping a reentry vehicle, except from very far away," said Matthew Hersch, an associate professor at Harvard University who specializes in the history of technology, by email. Fellow historian Michael J. Neufeld, a former curator of the Smithsonian Institute's National Air and Space Museum, was also taken aback: "I watched that live, and I was fairly amazed," he said.

The scene was captured by a camera outside Starship on one of its nose flaps, streamed up to SpaceX's Starlink constellation and onto X. The exterior view, and the livestreaming, were unique.

"Reentry has been extensively photographed, filmed, or videotaped from inside a reentry vehicle, but only for later viewing,"

Hersch said. As the New York Times noted, Varda Space Industries, a California company that makes commercial reentry vehicles, in February shared a video of plasma outside one of its capsules.

Usually, plasma quickly blocks radio transmissions from a space vehicle, causing the infamous blackout period that mission controllers must endure until a vehicle slows enough that the plasma subsides and the link can be restored. In this case, viewers enjoyed 2 minutes and 20 seconds of the plasma shifting about as Starship maneuvered. It was mesmerizing, almost tranquil, but one of the SpaceX narrators placed the entry temperatures at 2,600 degrees Fahrenheit (1,400 Celsius).

How did this transmission persist so long? Livestream narrator Siva Bharadvaj, a space operations engineer, provided a clue early in the livestream when he previewed the coming moments. Starship, he said, is so big that it will leave a "wake" through the atmosphere. The implication was that the video might continue streaming, and indeed it did — for a while. The transmission finally broke at an altitude of 75 kilometers over the Indian Ocean, though SpaceX continued to get some telemetry data to an altitude of 65 kilometers. SpaceX later announced that the vehicle was lost. ★

— *Cat Hofacker and Ben Iannotta*