Does the Vision for Space Exploration See Beyond 28 μm?

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Outline

- Current Astronomy & Physics missions portfolio
- Astronomical Search for Origins roadmapping
  - Who, What, When, Where, Why, How
  - Issues for this roadmap cycle

Chandra SSU

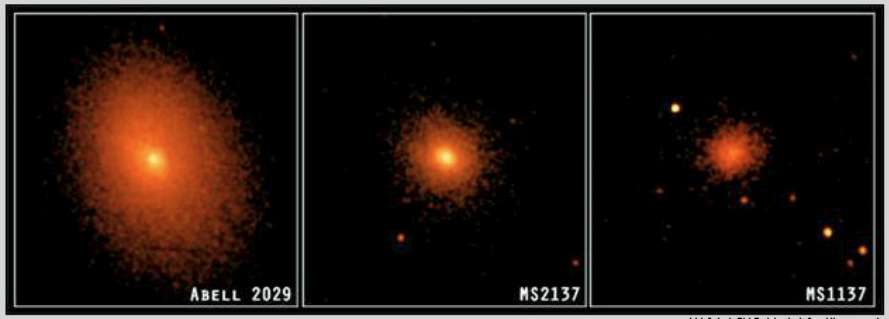
MSNBC HOME

TECHNOLOGY & SCIENCE

Space.com

X-ray scan charts dark energy's impact

Telescope data confirm galaxies' cosmic speed-up



NASA / CXC / IoA / S. Allen et al.

The Chandra X-Ray Observatory analyzed the hot gas surrounding galaxy clusters to determine their mass and distance. These three examples are Abell 2029, MS2137.3-2353 and MS1137.5+6624, seen as they looked 1 billion, 3.5 billion, and 6.7 billion years ago, respectively. Researchers found that the clusters were significantly farther away than they would have been if dark energy were not a factor.

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SCIENCE & SPACE

Chandra unlocking mystery of 'dark energy'

X-ray measurements indicate universe could expand forever

Tuesday, May 18, 2004 Posted: 6:45 PM EDT (2245 GMT)

(CNN) -- The Chandra Space Telescope has gathered further evidence the universe is expanding at an accelerating rate, scientists at NASA and Britain's Institute of Astronomy announced Tuesday. The finding sheds new light on a force known as "dark energy."

This optical and X-ray composite image shows Abell 2029, one of 26 galaxy clusters studied by Chandra.

"Dark energy is perhaps the biggest mystery in physics," said Steve Allen at the Institute of Astronomy in Cambridge, England.

Analysis On-Line Publication

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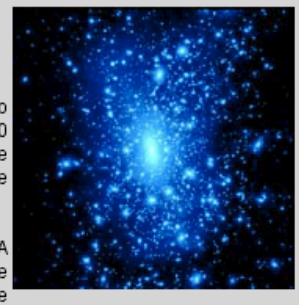
Devastating universe dark energy really exists

17:38 2004-05-19

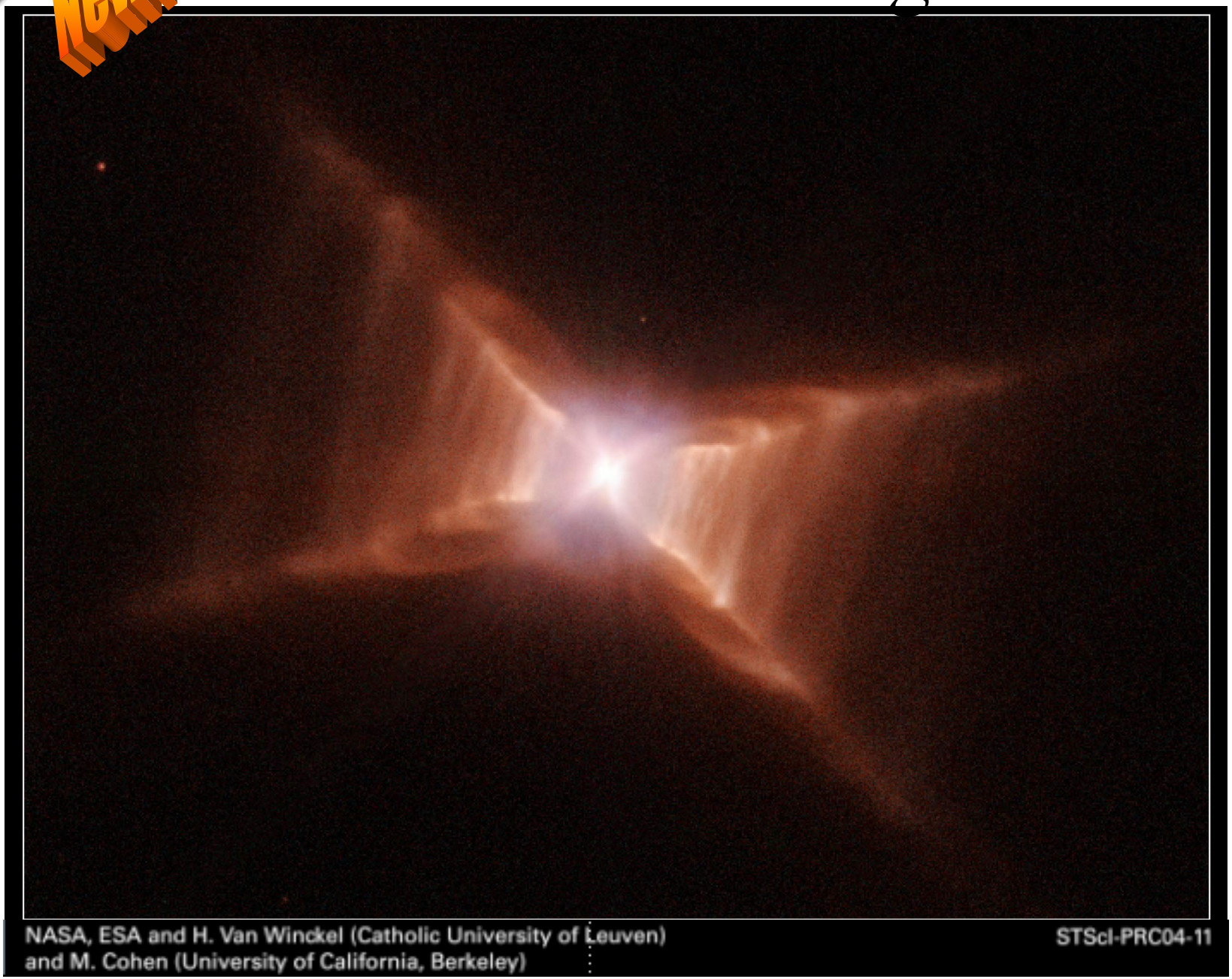
A research team used NASA's orbiting Chandra X-Ray Observatory to study 26 clusters of galaxies at distances between one billion and 10 billion light years from Earth. It found new support for the existence of "dark energy," a mysterious force that may be pushing the universe apart.



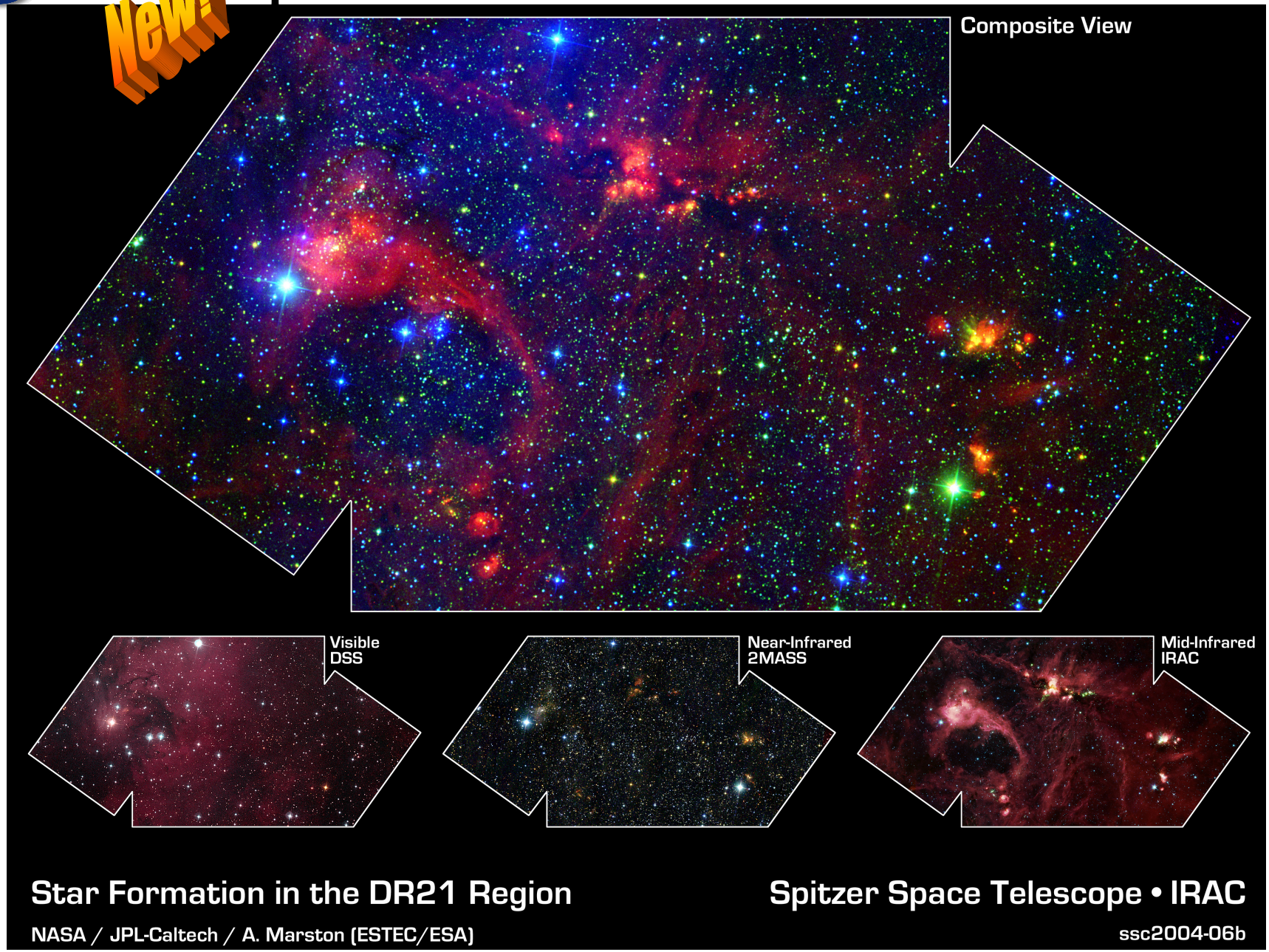
Study leader Steven Allen of the University of Cambridge told a NASA briefing yesterday that the dark energy appears to behave much like what Einstein dubbed the "cosmological constant," a fudge factor he included in his general theory of relativity in 1917 as a sort of antigravity to keep the universe from collapsing under its own weight.

NY Times, Washington Post, Florida Today, Washington Times, Daily Star, Star Tribune, Houston Chronicle, BBC, Discovery Channel, Space Today, Science News, New Scientist, NPR Science Friday, The Australian, The New Homemaker, Christian message board, astronomy clubs....

HST - Red Rectangle



Spitzer - Star Formation



Astronomy and Physics Operating Missions Status

	Launch/EOM	Mar	Apr	May	STATUS
HST (Prime)	4-25-90 2010	GRN	GRN	GRN	PRs on Sedna 4/15, 14th anniv. Image 4/22
Rossi XTE (Extended)	12-30-95 9-30-05	GRN	GRN	GRN	
2MASS (Extended)	4-1-97 9-30-04	GRN	GRN	GRN	
SWAS (Extended)	12-3-98 9-30-04	GRN	GRN	GRN	Mission extended because PI is proposing MoO through Discovery AO
FUSE (Extended)	6-24-99 9-30-05	GRN	GRN	GRN	
Chandra XO (Prime)	7-19-99 7-19-10	GRN	GRN	GRN	Chandra SSU on Dark Matter 5/18. PRs on X-ray Obs ot Titan's atmosphere 4/5; SNR on 4/20
XMM-Newton (Prime)	12-9-99 12-9-04	GRN	GRN	GRN	PR on X-ray "solar cycle" detected in distant star, 5/10.
HETE-2 (Ext-Extended)	10-8-00 7-31-04	GRN	GRN	GRN	
WMAP (Extended)	6-30-01 9-30-05	GRN	GRN	GRN	
Integral (Prime)	10-17-02 9-21-04	GRN	GRN	GRN	
CHIPS (Extended)	1-15-03 7-12-04	GRN	GRN	GRN	
GALEX (Prime)	4-28-03 8-25-05	GRN	GRN	GRN	FUV detector taken down 4/9 to prevent blob buildup. NUV working nominally.
Spitzer (Prime)	8-25-03 5-25-06	GRN	GRN	GRN	Spitzer SSU 5/26.

Astronomical Search for Origins Developmental Missions Status

	Launch	Mar	Apr	May	STATUS
HST Robotic	TBD	GRN	GRN	RED	Deorbit servicing study on track; NAS Review established.
SOFIA	Apr '05	YEL	YEL	RED	Schedule for ORR significantly delayed plus estimated Ops cost well over budget. Successfully completed Fuselage Proof Pressure tst - critical milestone.
Keck Interferometer	2005	YEL RED	YEL RED	YEL RED	Project passed V2 ORR; Nuller lab performance improved, planning for pre-ship. MK Management Brd asked UH to request permit application extension.
LBTI	Sep '06	GRN	GRN	GRN	First hardware for beam combiner in work. BLINC to test closed loop software week of April 27th.
Kepler	2007	GRN	GRN	GRN	First flight CCDs in house at Ball, no schedule slack remaining. Updated costs and full cost accounting issues in work.
SIM	Dec '09	GRN	GRN	YEL	Project has received updated NGST cost proposal for phase B/C/D. Cost has increased significantly.
JWST	Aug '11	GRN	GRN	GRN	Fine guidance sensor SRR and bilateral meeting with ESA successful. Manufacture of eng. unit and primary mirror segment continues on track.
TPF	TBD	GRN	GRN	GRN	Presentation of new TPF concept presented to CAA 5-18-04

GRN	Proceeding on Plan, only normal, minor problems
YEL	Significant Problems or Concerns but feasible plan to resolve
RED	Major Problems; Solution path unclear

Structure and Evolution of the Universe Developmental Missions Status

	Launch	Mar	Apr	May	STATUS
GP-B	Apr '04	YEL	GRN	GRN	IOC has made slow but steady progress.
Swift	Sep '04	YEL	YEL	YEL	Image Processor problem not yet resolved. Options identified.
Astro-E2	Feb '05	GRN	GRN	GRN	Astro-E2's fifth and final telescope module, XRT-5. was delivered to Japan 5-14-04.
GLAST	Feb '07	YEL	YEL	YEL	Static test in May and Vibration test in June to qualify new LAT tracker mechanical interface. New LAT Calorimeter electronics board and capacitors being procured.
Herschel	2007	YEL	YEL	YEL	Project estimates need for funding increase in FY05. Production of instrument components going well.
Planck	2007	YEL	YEL	GRN	Production of instrument components is going well.
EUSO	2008	RED	RED	RED	Availability of Shuttle for launch in now uncertain.
LISA	NET 2012	YEL	YEL	YEL	Working to resolve management issues with ESA, and between GSFC and JPL before June 04 Code S bilateral with ESA.
Con-X	TBD	GRN	GRN	RED	Funding reduction in near-term threatens project viability long-term. Issues and options to be addressed through POP process.
Balloons	Ongoing	GRN	GRN	GRN	Successful test of new 37 MCF Heavy-lift (8000 lb) Balloon

GRN	Proceeding on Plan, only normal, minor problems
YEL	Significant Problems or Concerns but feasible plan to resolve
RED	Major Problems; Solution path unclear

What is the Roadmap?

- Concise explanation of community's and NASA's goals for the theme
- Guide for Astronomy and Physics Division priorities
- Scorecard for measuring Astronomy and Physics Division progress
- Input for OSS plans, NAS plans

Roadmap Mile Markers

- July 26 First Roadmap team meeting (San Diego)
- Initial draft October
- AAS town hall meeting/2nd team meeting (San Diego)
- Second draft April 2005
- Final draft June 2005
- Publication November 2005

Who's involved

- Origins Subcommittee (writers and reviewers)
- Technologists (GSFC, JPL, MSFC)
- You!

“Writing Team” Roster

- Adam Burrows (Steward Obs., chair)
- Andrew Blain (Caltech)
- James Green (Colorado)
- Thomas Greene (Ames)
- Mike Hauser (STScI)
- Sally Heap (GSFC)
- Vicki Meadows (JPL)
- Michael Meyer (Steward Obs.)
- Mike Shara (AMNH)
- David Weinberg (Ohio State)
- Alycia Weinberger (CIW)

Major Issues for 2006 Roadmap

- Interplay of Vision for Space Exploration and the Origins Program
- TPF --> TPF-C and TPF-I
  - Missions beyond the TPFs
- Research and Analysis program and loss of Code R funds
- HST final years

Origins Science in the New Vision

Implement a sustained and affordable human and robotic program to explore the solar system and beyond

Vision for Space Exploration

Conduct advanced telescope searches for Earth-like planets and habitable environments around other stars

ASO

What are the properties of giants orbiting other stars?
How common are terrestrial planets?
What are their properties and which of them might be habitable?
Is there life on planets outside the solar system?

Origins Investigations

11. Study the properties of giant extrasolar planets using the combined light of planet and parent star.
12. Detect giant planets by direct imaging, and study their properties
13. Investigate which nearby stars host terrestrial planets that might be suitable for life
14. Study the composition of atmospheres of terrestrial planets orbiting nearby stars
15. Determine optimal biosignatures for life on other worlds
16. Search for evidence of life on habitable planets orbiting other stars