



COVER: CASEY REED

INSET IMAGES

NEIL ARMSTRONG: NASA

GEMINID METEOR: WALLY PACHOLKA

SATURN MOONS: NASA / JPL / SPACE SCI. INST.

STAR CLUSTER NGC 290: ESA / NASA

## FEATURES

### 20 Cosmic Collisions

**COVER  
STORY**

Astronomers seek direct observational evidence for multiple universes. *By Camille M. Carlisle*

### 28 Why Do Asteroids Come in Pairs?

A surprisingly large fraction of small bodies come in binaries and triplets. *By Michael Shepard*

### 34 Changing Times for U.S. Astronomy

The budgetary writing is on the wall for national observatories. *By J. Kelly Beatty*

### 36 Exploring Those Odd-Named Star Clusters

Collinder, Stock, Trumpler — open clusters with no Messier or NGC number can be surprisingly bright and easy. *By David A. Rodger*

### 68 ABCs of CCD Imaging

Follow these simple suggestions to get the most out of your CCD images. *By Warren Keller*

Vol 124, No 6. SKY & TELESCOPE (ISSN 0037-6604) is published monthly by Sky & Telescope Media, LLC, 90 Sherman St., Cambridge, MA 02140-3264, USA. Phone: 800-253-0245 (customer service/subscriptions), 888-253-0230 (product orders), 617-864-7360 (all other calls). Fax: 617-864-6117. Website: SkyandTelescope.com. © 2012 Sky & Telescope Media, LLC. All rights reserved. Periodicals postage paid at Boston, Massachusetts, and at additional mailing offices. Canada Post Publications Mail sales agreement #40029823. Canadian return address: 2744 Edna St., Windsor, ON, Canada N8Y 1V2. Canadian GST Reg. #R128921855. POSTMASTER: Send address changes to Sky & Telescope, PO Box 420235, Palm Coast, FL 32142-0235. Printed in the USA.

## On the cover:

Cosmologists think our universe might be just one bubble in a vast bubble bath of universes. If so, crashes between bubbles could leave detectable scars.

## OBSERVING DECEMBER

### 43 In This Section

### 44 December's Sky at a Glance

### 45 Binocular Highlight

*By Gary Seronik*

### 46 Planetary Almanac

### 47 Northern Hemisphere's Sky

*By Fred Schaaf*

### 48 Sun, Moon & Planets

*By Fred Schaaf*

### 50 Celestial Calendar

*By Alan MacRobert*

### 54 Exploring the Moon

*By Charles Wood*

### 56 Deep-Sky Wonders

*By Sue French*

## S&T TEST REPORT

### 60 S&T Test Report

*By Dennis di Cicco*

## ALSO IN THIS ISSUE

### 6 Spectrum

*By Robert Naeye*

### 8 Letters

### 10 75, 50 & 25 Years Ago

*By Roger W. Sinnott*

### 12 News Notes

### 18 Cosmic Relief

*By David Grinspoon*

### 64 New Product Showcase

### 66 Telescope Workshop

*By Gary Seronik*

### 76 Gallery

### 86 Focal Point

*By Andrew Chaikin*



There's more to find online @  
[SkyandTelescope.com](http://SkyandTelescope.com)

## NEW EQUIPMENT DIRECTORY

Browse hot products for all types of observing.

[SkyandTelescope.com/directory](http://SkyandTelescope.com/directory)



**SKY  
WEEK**

THOMAS BACKER

## SKYWEEK

Watch full episodes of our weekly PBS segment to find out what's currently up in the sky.

[skyweek.com](http://skyweek.com)

## SKY AT A GLANCE

Read up on the next week's celestial delights in our popular column. Also available as an app!

[SkyandTelescope.com/ata glance](http://SkyandTelescope.com/ata glance)

## TIPS FOR BEGINNERS

New to astronomy? Here's everything you need to jump in.

[SkyandTelescope.com/lets go](http://SkyandTelescope.com/lets go)



Find us on  
Facebook & Twitter