



# THE GALILEOSCOPE

FROM IYA 2009 TO IYL 2015...AND BEYOND!

**Rick Fienberg**

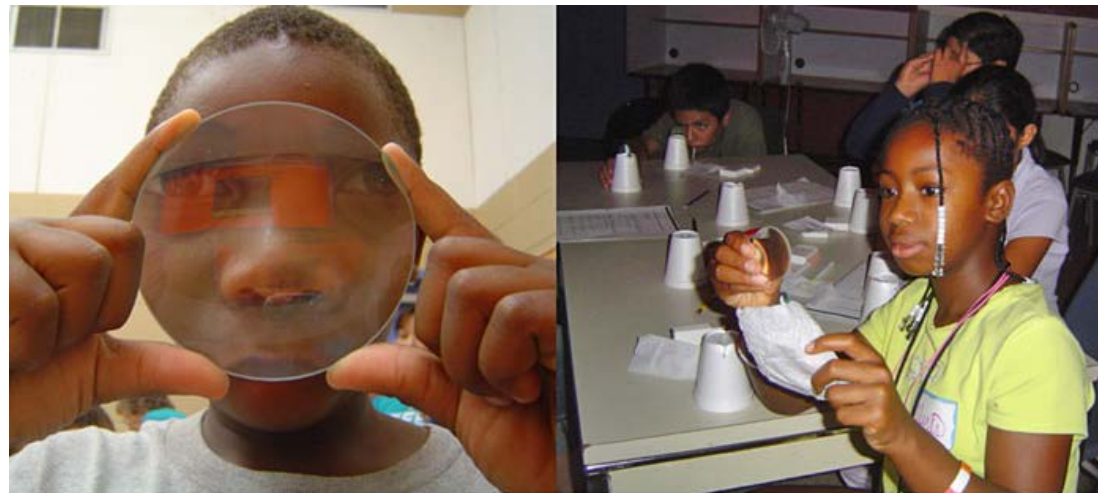
American Astronomical Society



IAU XXIX General Assembly, Division C Meeting, 7 August 2015, Honolulu, Hawai'i



# GALILEOSCOPE PROJECT GOAL



For the 2009 International Year of Astronomy, provide a telescope kit that serves educators and delivers a “Wow!” experience outdoors under the stars.



# We Evaluated Every Inexpensive Telescope & Telescope Kit on the Market: None Were of Good Optical & Mechanical Quality





- We developed our own product: the Galileoscope
- *Volunteer-managed & executed*
- Optically excellent, inexpensive telescope kit
- Suitable for optics education indoors & celestial observations outdoors
- No tools or adhesives needed for assembly & disassembly
- Instructions, observing guides & standards-based activity guides available for free in multiple languages



- 50-mm (2-inch) f/10 glass achromatic (doublet) objective
- 20-mm (25x) Keplerian eyepiece + 30-mm (17x) Galilean eyepiece, plastic
- Galilean eyepiece doubles as a 2x Barlow for 50x views of Saturn's rings



- Focuser accepts standard 1¼-inch eyepieces and camera adapters
- ¼-20 threaded nut in base fits all standard photo tripods



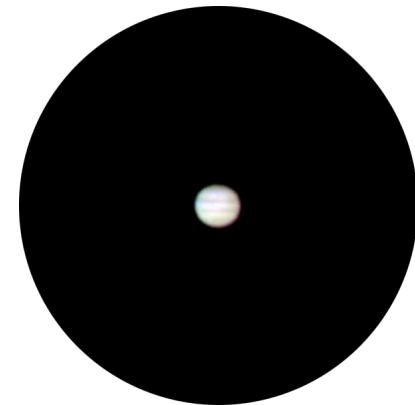
## EDUCATIONAL GOALS

- Assembly of kit is important; gives kids a sense of pride & mastery.
- Maximize educational value & utility: Integrate kits into inquiry-based educational material on image formation & telescopes.
- Professional-development program for educators (critical for long-term educational results).
  - Based on NSF-funded Hands-On Optics Project from NOAO, Optical Society of America & SPIE





Moon (above) & Jupiter (below) through the Galileoscope



Students with Galileoscopes at Arizona school



Galileoscope teacher workshops in Hawaii & Thailand





# FREE EDUCATIONAL MATERIALS, OBSERVING GUIDES & INSTRUCTIONS IN MULTIPLE LANGUAGES

**GALILEOSCOPE ASSEMBLY INSTRUCTIONS**

To begin, open the exterior box flaps to reveal the interior box. Under one flap, but not the other, you'll find two holes, as shown at right. Place a finger and thumb in the holes and pull out the interior box.

Parts are stacked in several layers. First you'll see a sheet with assembly instructions and a little plastic bag containing a paper sticker, a metal nut, and four rubber rings. Remove these and place them on a work table. The cardboard and set it aside. The box now looks like this:

Note that the tube in the middle has a plastic bag tucked under layers of white foam. Pull out the bag and remove the foam. The tube separates into two blocks, one thick and heavy, the other thin. The heavy block contains a large round lens wrapped in tissue paper and secured by two pieces of transparent tape. Carefully cut the tape so that one layer of foam unfolds from the others, and nestle the lens under a sheet of tissue paper. Set both foam blocks next to the other small parts on the table.

Logos: IAU, Sky & Photon Carriage, International Astronomical Union.

**پچھاڑی:**  
ابن ہٹ (D) کی مین ٹیوب کے ٹیبلٹ جیڑا کہ صوم میں دیکھا یا گیا ہے ٹیبلٹ۔ اب جو چھوٹی ٹیوب مین ٹیوب پر پہلے چڑا کی تھی اسی ٹیوب کے پچھے ہے پر صوم کی دوسرے رکھیں۔ اب مین ٹیوب (A) کے دوسرے پچھے ہے پر اس طرح رکھیں کہ ٹیبلٹ اور ہٹ ایک دوسرے کے اوپر پائل دوسرے پچھیں۔ اب ٹیبلٹ (E) کو مین ٹیوب میں لگا دیں۔

**پانچواں مرحلہ:**  
اب ریڈی بڑی گول رنگ (I) کو دونوں اطراف سے پڑھائیں۔ اس طرح سے دوسری مین ٹیوب بند ہو جائے گی۔ اب ٹیبلٹ کے بائیں ہٹ (1) کو مین ٹیوب کے اوپر رکھیں۔ اب صوم سے ہٹ کے ٹیبلٹ والے سٹیگر (II) کو مین ٹیوب پر پچھاڑیں۔ اس بات کا دھیان رہے کہ دوسری مین ٹیوب کو دیکھنا آگھوں کے لئے نقصان دہ نہ ہو سکتا ہے اور آگھیں مل بھی سکتی ہیں۔

آپ کو آئی ٹیبلٹ لیا ہے فرام گئے ہیں۔ ایک براؤن آئی ٹیبلٹ کا پورل (K) اور دوسرا چھوٹا آئی ٹیبلٹ کا پورل (L) ہے۔ ان دونوں آئی ٹیبلٹ پورل کو آپ دوسری مین ٹیوب کے لئے رکھنے ہی استعمال کر سکتے ہیں اور الگ الگ بھی جو بعد میں بیان کیا جائے گا۔ دونوں آئی ٹیبلٹ پورل آگھے آگھے پچھوں میں چھبے گئے ہیں اور ان دونوں کے اندر دنی صوم پر کچھ گول ٹیبلٹ ہیں جہاں آئی ٹیبلٹ کے لیڈر کے پچھوں سے۔

Even Urdu!

**Galileo's Classroom:**  
A Teacher Workshop in Celebration of the International Year of Astronomy 2009

Stephanie J. Slater,  
Janet M. Bailey and  
Michael G. Gibb



# GALILEOSCOPE SALES 2009–2014

- 225,000 Galileoscopes to 106 countries
- 30,000 small orders from individuals
- 500 large orders from institutions
- More than 30% of institutional sales are *repeat business*





## DONATION PROGRAMS: 25,000 GALILEOSCOPIES AROUND THE WORLD

- Over 7,000 kits distributed to US teachers for cost of shipping only
  - Claimed by 1,473 teachers in 6 weeks, in all 50 states
- Project ASTRO and NESTA teachers received 8,000 free Galileoscopes
- UNESCO sponsored 100 kits to each of 20 countries in Africa, Asia, and South America
- Over 7,000 telescopes donated to African nations through buy-one/give-one program





# INTERNATIONAL YEAR OF LIGHT 2015

- Led by European Physical Society with participation by US & international professional physics & optics societies
- Centennial of Einstein's general relativity & 50 years since discovery of cosmic background radiation by Penzias & Wilson
- Galileoscope selected by International Astronomical Union as a "Cosmic Light" Cornerstone Project
  - Large international installed user base
  - Well established, ready to run
  - Extensive, multilingual educational materials & user guides

**2015** INTERNATIONAL YEAR OF LIGHT  
AND LIGHT-BASED TECHNOLOGIES





**Redesigned Box for IYL 2015**



Jean & Ric Edelman donated 10,000 kits to US K-12 teachers

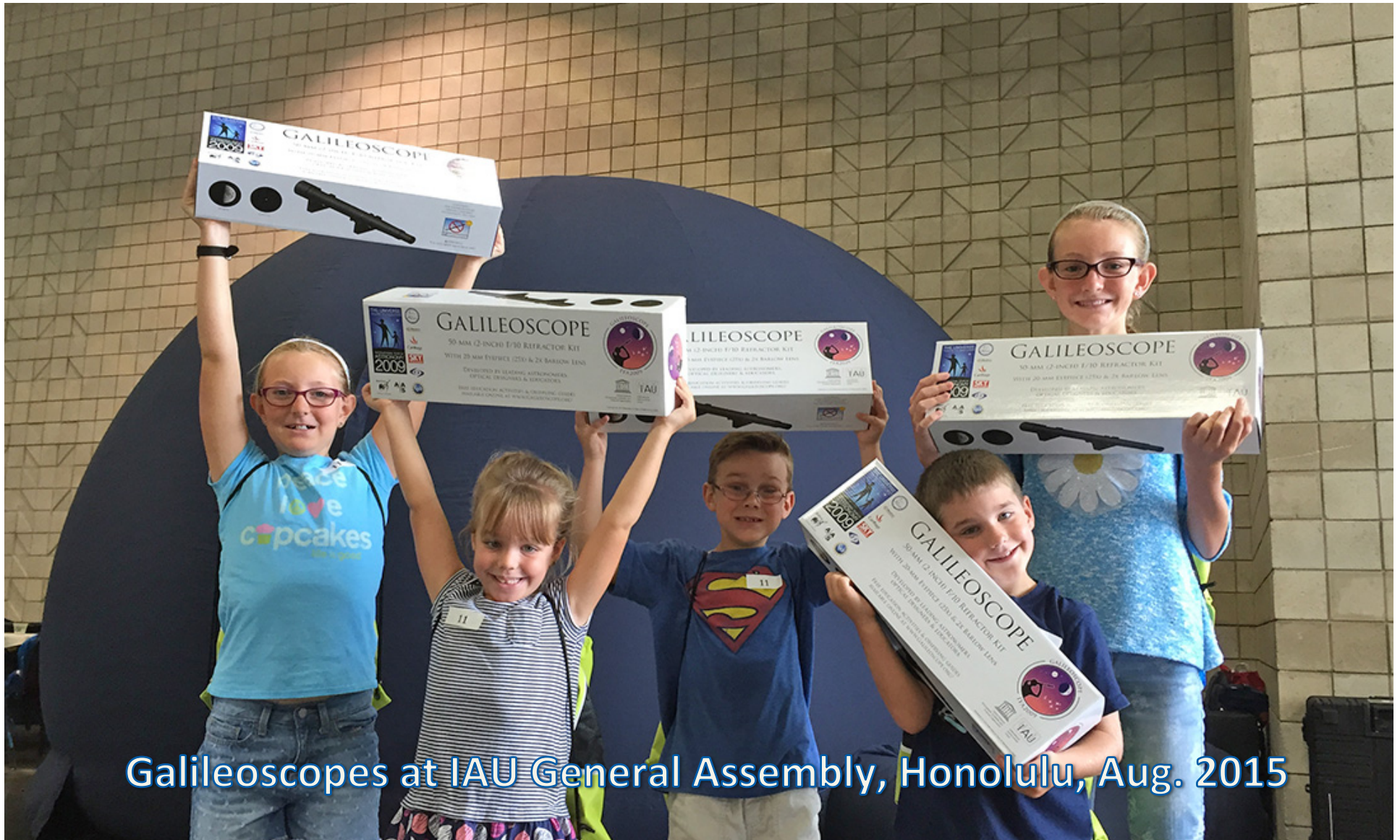


**Custom Edelman Box for IYL 2015**



**Galileoscope Workshop at 'Imiloa Astronomy Center, Aug. 2015**





Galileoscopes at IAU General Assembly, Honolulu, Aug. 2015



# THIS PROJECT ALMOST DIDN'T HAPPEN

- Trademark dispute over Galileoscope name.
- Very little funding; economic meltdown meant no large donations, no loans.
- Had to spend personal funds to produce tooling and replenish inventory.
- Had to collect order revenue in advance to pay for first manufacturing run.
- Took many months to get kits manufactured and delivered (mid-2009).
- Customer-service nightmare! Added volunteers and (minimally) paid staff.

Subsequent problems:

- Intellectual-property dispute with manufacturer of Galileoscope clone.
- Manufacturing partner went out of business; had to renegotiate with factory.



## BEYOND IYL 2015

- Possible very big EPO program
- Possible very big distribution deals

***Watch for announcements!***



**MAHALO NUI LOA!**

**<http://galileoscope.org>**