Amplify your view of the night sky

Night Vision Astronomy's Binocular Photon Machine will triple your telescope's aperture through electronics.

by Tom Trusock

I've long wanted to own an extremely large telescope, but the size, weight, and expense have put me off. Something that's intrigued me, though, is the capability provided by using a light-amplification device as sort of an aperture multiplier.

Night Vision Astronomy from Pound Ridge, New York, now offers an instrument that uses such technology. The Binocular Photon Machine (BIPH) is a third-generation light-amplification unit the company has modified for astronomical use. It's available in two flavors: one featuring a brand new night vision tube and a 2-year warranty for $3,995, or a model like I tested with a clean used tube and a 1-year warranty for $3,299.

First impressions and specs

Stored in its included hard-shell case, the BIPH is a rather unimposing piece of equipment. It's small and lightweight, about the size of a binoviewer with eyepieces, which makes it an easily portable device. Two AAA batteries power the BIPH and provide approximately 40 hours of operational time.

Night Vision Astronomy's Binocular Photon Machine is a light-amplification device that you can hold or attach to a telescope focuser.

The night vision tube has an optical window that lets you view the phosphorescent green image with both eyes (and from seemingly any distance). With this setup, eye relief is not an issue. One available option is a Hydrogen-alpha filter system. Another is an SLR camera lens adapter. Both came with my test rig.

The specifications on the BIPH say that you'll get a net gain of around 50,000 in light amplification. My tests showed this translated to an effective aperture gain around 3x, but gauging that was tricky. The BIPH, like all night amplification devices, is more sensitive to longer wavelengths such as red light and infrared than to shorter wavelengths like blue light. The aperture gain, therefore, isn't equal across different targets.

Accessories for the BIPH include camera lens adapters for hand-held operation and a Hydrogen-alpha filter (below) for use under a bright sky. All photos: *Astronomy*: William Zuback

Pointing the BIPH skyward

The BIPH worked best on globular clusters and emission and planetary nebulae. And I made a surprising find. Many globulars that I thought were resolution-limited through a particular telescope were actually light-limited. In other words, although the BIPH increases the light grasp of a 3-inch scope to that of an effective 9-inch telescope, you're still working with the resolution capability of a 3-inch instrument. When I was viewing globular cluster M22 through a 3-inch scope from the dark skies of the American West, however, the BIPH resolved it clear across its face.

I also had the opportunity to try the BIPH with a couple of camera lenses. With small, lightweight lenses, I hand-held the setup easily, and it provided a unique view of the night sky. I've seen the North America Nebula (NGC 7000) at low powers before, but I've never seen it this well defined. Because the BIPH works well into the infrared range, I also had great views of many dark nebulae strewn across the summer Milky Way.

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Getting the most from it

I used the BIPH on several different telescopes of varying design, and while it worked on all, it worked best on well-baffled systems. The BIPH is sensitive to stray light. While observing through a 30-inch reflector from a dark site, I had no issues whatsoever. However, using my observatory-based 18-inch reflector, I had to turn off all red lights to maintain good image contrast. Under the same conditions, I found I didn't have to make any such concession with various refractors or Schmidt-Cassegrain telescopes.

If you've never used night-vision technology, you might find the view through the BIPH is not quite what you're accustomed to. It's more like looking at a computer monitor than it is traditional observing. The image it presents is green.

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The Hubble Heritage Team (AURA/STScI/NASA)

The front of the BIPH (left) sports a nosepiece that fits 2" focusers. An optional 1¼" adapter is available. The rear (far left) of the unit's port lets you use both eyes to view the phosphorescent screen. The BIPH measures 9 by 5 by 3 inches (22.9 by 12.7 by 7.6 centimeters).

Specifications

Photocathode: Gallium arsenide
Output screen: P43 phosphor
Luminous gain: 40,000 to 70,000 at 0.000002 foot-candles
Resolution: 64 lines/millimeter
Power: Two AAA batteries (40 hours)
Nominal tube life: 10,000 hours
Telescope adapter: 2" nosepiece (1¼" adapter available)
Price: $3,995 new; $3,299 used

Green is the choice because the eye is capable of differentiating between more shades of green than any other available phosphorescent color.

Depending on the telescope's focal ratio, some noticeable scintillation (twinkling akin to static on a TV) may be present in the system. Long-focal-ratio instruments can reduce the light received. I wondered whether the green glow would degrade my dark adaption. While there were some effects, I found them noticeable only when switching back and forth between amplified and natural views. In some respects, using the BIPH is similar to astroimaging, but there's no integration time, so images display immediately, and you don't require a tracking mount.

To use the BIPH is to love it

I wish the BIPH amplified the full spectrum of light evenly, but that's unfortunately a byproduct of current night-vision technology. And, while it is on the expensive side, it's perfect for outreach. What's more, it can make city-based deep-sky observing more satisfying. Finally, it's a superb addition to your travel kit. If at all possible, try the BIPH before you buy it. Once you know what you're getting into, you'll be a satisfied amateur astronomer seeing objects you didn't think possible before.

The BIPH comes in a padded, watertight case (Model 1450 Pelican) that protects the device and any accessories you store with it.