

Wide-field imaging with a ZWO ASI2600MC Pro Duo & Player One Poseidon-C Pro

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The **ASI2600MC/MM Duo** (Figure 1, 2 & 3) combines imaging and guiding sensors in a single compact body. The main sensor is the Sony IMX571, featuring a native 16-bit ADC, 14 stops of dynamic range, and a $3.76\mu\text{m}$ square pixel array. Readout noise is as low as 1.0 e^- , and the full well capacity reaches an impressive 73 ke. Remarkably, it exhibits no amp glow.

The guide sensor is the Type 1/1.8 SC2210, known for its excellent near-infrared (NIR) sensitivity. The sensor size is $7.68\text{ mm} \times 4.32\text{ mm}$, with $4\mu\text{m} \times 4\mu\text{m}$ pixels arranged in a 1920×1080 array and a full well depth of 8780 e.

Stars at the corners of guide images may appear slightly distorted when affected by the reducer's back focus distance. This is not caused by sensor tilt and does not impact normal use.

Main Imaging Sensor: Sony IMX571

- **Sensor Type:** APS-C format, back-illuminated CMOS
- **Resolution:** 26 megapixels (6252×4176)
- **Pixel Size:** $3.76\mu\text{m}$ square
- **ADC:** Native 16-bit (not emulated), enabling smooth tonal transitions
- **Dynamic Range:** Up to 14 stops
- **Full Well Capacity:** Up to 73,000 electrons (at gain -25)
- **Read Noise:** As low as 1.0e
- **Quantum Efficiency (QE):** Peak over 80%
- **Amp Glow:** None — thanks to zero-amp glow circuitry

Integrated Guiding Sensor: SC2210

- **Sensor Type:** 1/1.8" CMOS (same as ASI220MM Mini)
- **Resolution:** 1920×1080
- **Pixel Size:** $4\mu\text{m}$
- **Sensor Size:** $7.68\text{ mm} \times 4.32\text{ mm}$
- **Full Well Capacity:** 8780e
- **QE Peak:** Up to 92% at 500 nm
- **Read Noise:** As low as 0.6e
- **NIR Sensitivity:** Excellent — ideal for guiding in faint star fields

Cooling & Build

- **Cooling System:** Two-stage TEC cooling
- **Delta T:** $30\text{--}35^\circ\text{C}$ below ambient (at 30°C ambient)
- **Anti-Dew:** Built-in dew heater
- **Housing:** Compact design with tilt adjustment via rear screws
- **Connectivity:** Single USB 3.0 cable for both imaging and guiding
- **Buffer:** 512 MB DDR3 for stable data transfer

Performance & Usability

- **Frame Rate:** Up to 15 FPS in RAW8 mode at full resolution
- **STARVIS Technology:** Enhances sensitivity and reduces noise

- **No Need for OAG:** Integrated guider simplifies setup and cabling
- **Ideal For:** Portable rigs, remote setups, and users seeking high sensitivity with minimal complexity

The **Poseidon-C Pro** cooled camera, developed by Player One Astronomy, is designed for advanced deep-sky object (DSO) imaging. It features the Sony IMX571 APS-C format colour sensor with a resolution of 6252×4176 pixels (26 MP), a pixel size of $3.76 \mu\text{m}$, and a diagonal of 28.3 mm. The sensor supports a full well capacity of 71.7 ke.

Design & Build

- The camera body adopts a polygonal octagonal design with cambered surfaces and rounded chambers. The front piece is circular to minimize diffraction when used with RASA systems.
- The red-and-black colour scheme, enhanced by a fine matte finish, gives the camera a sleek and professional appearance.

Sensor Tilt Plate

- A rear 4-point adjustable sensor tilt plate allows users to correct field curvature more precisely. Each corner can be independently adjusted, and a built-in high-density sponge pad prevents light leakage from side slits.

Cooling System

- Equipped with a dual-stage TEC cooling unit, the camera achieves a ΔT of over 40°C . The improved structure prevents heat from re-entering the camera chamber.
- Integrated anti-dew heater with adjustable power settings helps combat condensation during imaging sessions.

✅ Pros of the IMX571 CMOS Sensor

High Resolution & Pixel Density

- **26 MP APS-C format** (6252×4176 pixels) with **$3.76 \mu\text{m}$ pixel size**
- Excellent for capturing fine detail in deep-sky objects

Low Noise Performance

- **Native 16-bit ADC** enables smoother gradients and better dynamic range
- **Read noise as low as 1.0e** at optimal gain settings
- **Zero-amp glow** thanks to advanced circuitry

High Quantum Efficiency

- **Peak QE >80%**, meaning more photons are converted into signal
- Great sensitivity across visible spectrum, especially in $\text{H}\alpha$ and OIII regions

Deep Cooling Compatibility

- Works well with TEC cooling systems, achieving ΔT of $30\text{--}35^\circ\text{C}$ below ambient
- Reduces thermal noise for long exposures

STARVIS Technology

- Back-illuminated design improves low-light performance
- Ideal for faint nebulae and galaxies

Versatile Format

- APS-C size offers a good compromise between field of view and resolution
- Compatible with many telescope setups without excessive vignetting

✗ Cons of the IMX571 CMOS Sensor

Cost & Variants

- **Consumer vs. industrial grade** versions exist
 - Consumer-grade chips (used in most astro cameras) are rated for ~300 hours/year
 - Industrial-grade chips offer better thermal stability and longevity, but are pricier

Rolling Shutter

- Uses a **rolling shutter**, which can introduce artifacts in fast-moving scenes
- Not a major issue for long-exposure astrophotography, but limits use in high-speed imaging

Backfocus Constraints

- Some camera bodies (e.g., Touptek) have **fixed backfocus** around 17.5 mm
- Limits flexibility in optical train design compared to ZWO's 6.5 mm backfocus

Dew Risk

- High cooling performance can lead to **dew formation** without proper dew control
- Requires active dew heaters or desiccants

Sensor Packaging

- **Plastic packaging** in consumer-grade chips may be less thermally stable than **ceramic** industrial versions
- Can affect flatness and performance under deep cooling



Figure 1 – ZWO ASI2600MC Duo.













					
Sensor IMX571	APS-C 23.5×15.7mm	Resolution 6248×4176	ADC 16bit	FPS 15(RAW8)	Full well 50Ke
					
Read noise 0.9e-4.2e	Cooling Temp 30°C-35°C	DDR3 Buffer 512MB	USB 3.0	QE Color: 80% / Mono: 91%	Pixel Size 3.76µm

Figure 2 – ZWO ASI2600MC Duo Specs.



Figure 3 - ZWO ASI2600MC Duo, Samyang 135mm f/2, SW Star Adventurer GTi, ASI AIR Mini. Pedro RÉ (2025).



Figure 4 – Player One Poseidon-C Pro. Samyang 135mm f/2. Pedro RÉ (2025).



Figure 5 - Player One Poseidon-C Pro. Samyang 135mm f/2, Paramount ME. Pedro RÉ (2025).



Figure 6 - NGC700/IC5070, 240 Min (48x5Min), Samyang 135mm F/2 (@F/2.8), Sky-Watcher Star Adventurer GTi, ZWO ASI AIR Mini, ZWO ASI2600MC DUO, ASI120MM Mini (Guide), Altair QuadBand CMOS Optimised Filter. Pedro R   (2025).



Figure 7 - NGC700/IC5070, 240 Min (48x5Min), Samyang 135mm F/2 (@F/2.8), Sky-Watcher Star Adventurer GTi, ZWO ASI AIR Mini, ZWO ASI2600MC DUO, ASI120MM Mini (Guide), Altair QuadBand CMOS Optimised Filter. Pedro RÉ (2025).



Figure 8 - NGC700/IC5070, 200 Min (40x5Min), Samyang 135mm F/2 (@F/2.8), Sky-Watcher Star Adventurer GTi, ZWO ASI AIR Mini, ZWO ASI2600MC DUO, ASI120MM Mini (Guide), Altair QuadBand CMOS Optimised Filter. Pedro RÉ (2025).

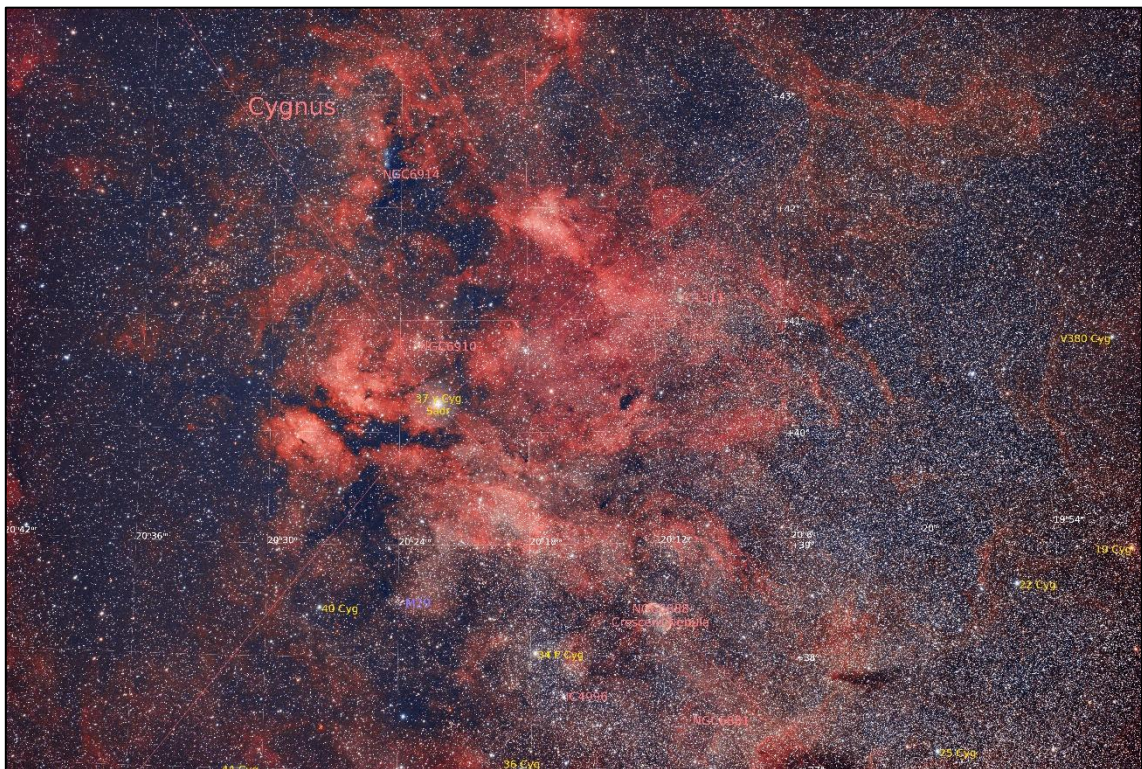


Figure 9 - NGC700/IC5070, 200 Min (40x5Min), Samyang 135mm F/2 (@F/2.8), Sky-Watcher Star Adventurer GTi, ZWO ASI AIR Mini, ZWO ASI2600MC DUO, ASI120MM Mini (Guide), Altair QuadBand CMOS Optimised Filter. Pedro RÉ (2025).



Figure 10 - NGC7000. 180min (36x5min). Samyang 135mm F/2 (@F/2.8), PLAYER ONE POSEIDON-C PRO, Optolong L-eXtreme filter, Paramount ME (protrack enabled). Pedro RÉ (2025).

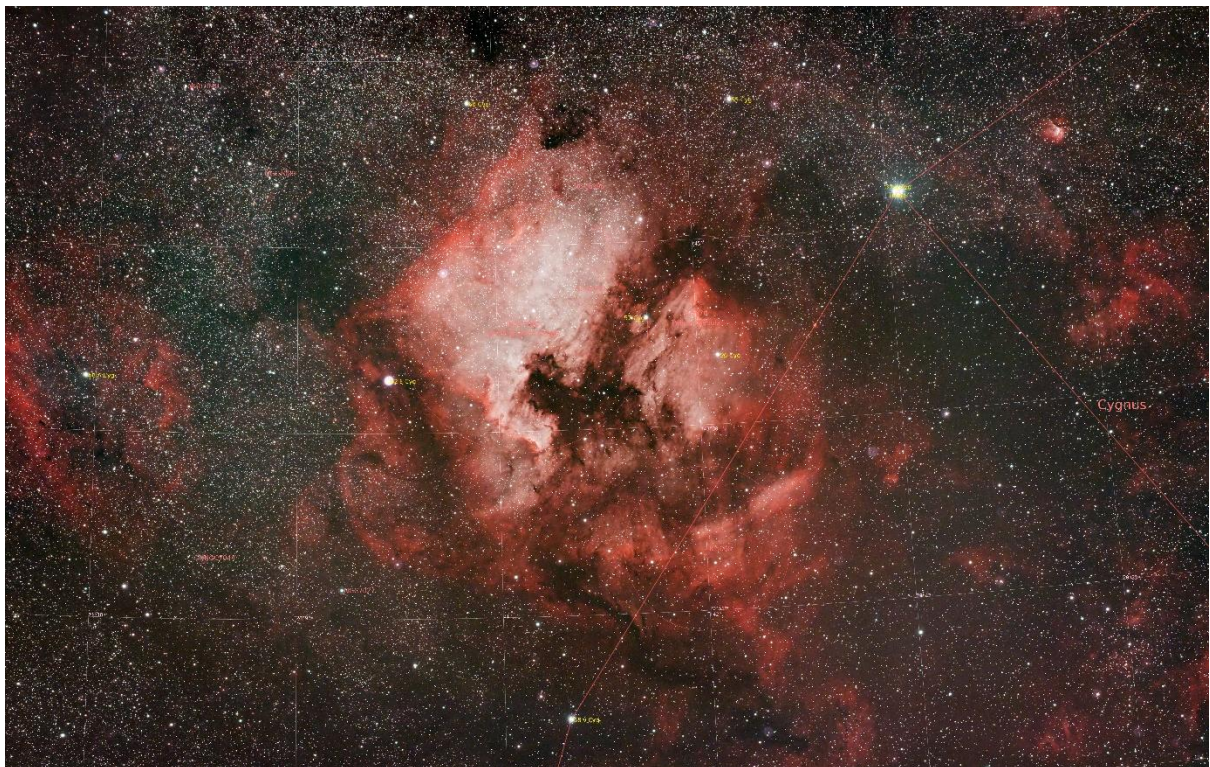


Figure 11 - Figure 10 - NGC7000. 180min (36x5min). Samyang 135mm F/2 (@F/2.8), PLAYER ONE POSEIDON-C PRO, Optolong L-eXtreme filter, Paramount ME (protrack enabled). Pedro RÉ (2025).

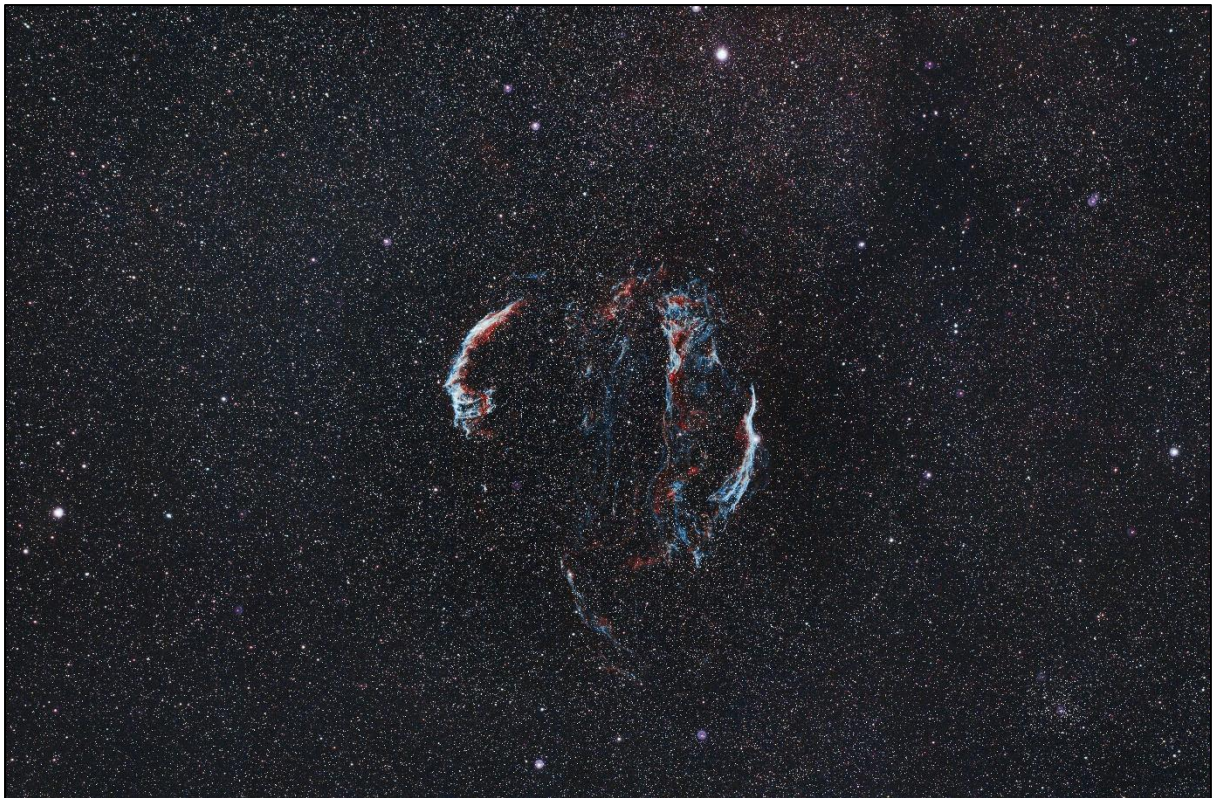


Figure 12 - VEIL & CIRRUS NEBULAE. 180min (34x5min). Samyang 135mm F/2 (@F/2.8), PLAYER ONE POSEIDON-C PRO, Optolong L-eXtreme filter, Paramount ME (protrack enabled). Pedro RÉ (2025).



Figure 13 - VEIL & CIRRUS NEBULAE. 180min (34x5min). Samyang 135mm F/2 (@F/2.8), PLAYER ONE POSEIDON-C PRO, Optolong L-eXtreme filter, Paramount ME (protrack enabled). Pedro RÉ (2025).

References:

<https://www.zwoastro.com/> ZWO Web page

<https://player-one-astronomy.com/> Player one astronomy Web page

https://pedroastrophotography.com/samyang_135_f2_widefield.html Pedro RÉ's Web page

Youtube Videos (Pedro RÉ):

https://youtu.be/ANX2d1rQ4_Y

WIDEFIELD CMOS IMAGING | Pedro RE' SAMYANG 135mm F/2.0 | ZWO ASI 2600MC DUO | SW Star Adventurer Gti | ASI AIR mini (FIRST LIGHT)

<https://youtu.be/UoZyEj-UaAc>

WIDEFIELD CMOS IMAGING | Pedro RE'
Samyang 135mm f/2 | Player One Poseidon-C Pro

<https://youtu.be/KYqz1m4keRg>

Image Processing Tutorials | Pedro RE'
ONE SHOT COLOR CAMERA IMAGE PROCESSING WORKFLOW (PixInsight)