Astrophotography

What can be done with a camera and ...

... nothing else?
... a DIY star tracker?
... an amateur telescope?
Astrophotography

Comet Holmes

Aurora Borealis

Exp: 30s  f/4  FL: 300mm  Nikon D200

Exp: 5s  f/2.8  FL: 24mm  Fujichrome ISO 200

Exp: 5s  f/2.8  FL: 24mm  Fujichrome ISO 200

Exp: 1/300s  f/4  FL: 500mm  Nikon D200

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Tracking the Stars

How can the sky be photographed without the stars trailing?
Build a device to compensate for the Earth’s rotation — a star tracker.

Ideally... For K2 this means...
Compact Footprint no larger than A4
Light Less than 1 kg
Strong Able to support a digital SLR
Accurate Exposures of up to 15 minutes
Battery operated AA batteries
Low power Run for ~6 hours
Cheap Cost < £50 for all components
Easy to construct Manual tools (no workshop)
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K2 Star Tracker

K2 off  K2 on

Exp = 30s  FL = 1000mm

iOptron SkyTracker

An alternative is a commercial product like the iOptron SkyTracker™.

Milky Way from Teide Observatory

Exp = 20 x 1m  f/2.8  FL = 150mm  Nikon D200

Inside the SkyTracker

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Polar Alignment

Attaching a Camera

Milky Way

Image of the Milky Way taken with a 10mm wide-angle lens. 6 exposures of 4 minutes each.

Milky Way

Image of the Milky Way taken with a 85mm lens. M31: mosaic of 4 images each a short 10 exposures at 20s.
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Antares and Rho Ophiuchi

With a 135 mm telephoto lens more detail can be captured in the region north of Antares, including the nebulosity around Rho Ophiuchi.

Longer focal length lenses may show some trailing unless the polar alignment of the tracker is set carefully.

Shorter exposures usually gets around that problem.

Milky Way from Kenya

Telescopes
Astrophotography

Pleiades Star Cluster

Exp = 1/25s  f/10  FL = 2000mm  Nikon D70

Saturn Video

Exp = 1/25s  f/38  FL = 2000mm  Canon XM2 camcorder

Andromeda Galaxy

Exp = 2 x 30s  f/4  FL = 3000mm  Nikon D70
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Helix Nebula

Hubble

NGC7000 North America Nebula

Single row image
20 images stacked in Image DSSM
Colours enhanced in GraphicConverter

Taken with a Nikon D3200/DSLR with a Sigma 180-300mm lens. Each exposure is 10s at f/4. © Steve Barrett 2012

Markarian’s Chain

Exp = 10 x 2m  f/4  FL = 300mm  Nikon D3200

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