Aperture and Bandwidth at H-alpha Telescopes for Solar Observing

Any amateur astronomer knows that more aperture at a night-sky telescope will provide more resolution AND more light. So many more deep-sky objects will become visible at larger aperture.

Therefore, many amateur astronomers guess that it will be the same at solar observing with H-alpha telescopes. They think that more objects like filaments or prominences will become visible at H-alpha telescopes with larger aperture. But this is wrong!

Solar observing and observing the starry night sky is completely different. There comes more than enough light from our sun, so larger aperture is not needed for collecting more light. Larger aperture is ONLY needed for more resolution.

But there is another specification at H-alpha telescopes, that don’t exist at normal night-sky telescopes. This is the bandwidth.

What does aperture and bandwidth do at solar observing? Let’s explain it at real examples.
Aperture

Below you will find two images of the sun. Both images are made at the same day and show the same area of the sun.

Both images are made with normal H-alpha telescopes with only one Etalon at a bandwidth around 0.7 Angstrom. There was different imaging processing, therefore you have different colors. But this doesn’t matter. You can see at both images the same filaments, prominences and a sun-spot. But the resolution is really different. The first picture was taken by an LS35THa telescope.
with only 35mm aperture, but the second image was taken by a LS80THa telescope with 80mm aperture.
The difference in the resolution at the images shows clearly what larger aperture will do at H-alpha telescopes. Larger aperture will NOT give more contrast. There will NOT more filaments, prominences or other objects become visible at larger aperture. Larger aperture will ONLY offer more resolution!
The larger the aperture is, the higher is the possible magnification. By more magnification you will see more details at the visible objects, but you will not see more objects.

Bandwidth

Now we will take a look what different bandwidth will do. Again you will find below two images of the sun that show the same area, and that are taken at the same day.

But now both images are taken at the same aperture of 80mm with an LS80THa telescope. At the left image it is again a standard LS80THa with a bandwidth around 0.7 Angstrom. But the image on the right side was taken by a double-stacked LS80THa with only around 0.5 Angstrom bandwidth.
The image on the right side shows much more contrast. The filaments and other objects on the solar surface are much better visible. And there are really some very small filaments visible that are not visible at the left image.
This is what reducing the bandwidth by double-stacking really will do: It provides much more contrast, and more objects on the solar surface will become visible.