

# Choosing and Using Telescope Filters

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June 3, 2017

# References

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## Choosing:

<http://agenaastro.com/choosing-a-color-planetary-filter.html>



<https://www.telescopesplus.com/blogs/helpful-information/18963396-how-filters-can-better-your-view>

<http://www.wikihow.com/Use-a-Color-Filter-for-a-Telescope>

## DSO:

<http://www.skyandtelescope.com/astronomy-resources/astronomy-questions-answers/differences-between-nebula-filters-and-light-pollution-filters/>

<http://www.prairieastronomyclub.org/useful-filters-for-viewing-deep-sky-objects/>



<http://quarkyscience.ca/shop/crystalview-moon-skyglow-filter-1-25/>

# Topics

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- What are filters?**
- How do I use them?**
- What is the best filter for...**
  - ...Planets?**
  - ...The Moon?**
  - ...Deep Sky Objects?**

**What are filters?**

**Do I really need them?**

- Colour filters block certain wavelengths of light, while allowing other wavelengths to pass. For example, a red filter blocks out all but the red wavelengths of light.**
  - If you look at an object that is primarily red, the object appears very bright.**
  - Areas which are not red appear dark because they contrast with the wavelength of light being passed by the filter.**
- Filters can greatly enhance your ability to discern small details on solar system and deep sky objects.**
- Other filters reduce the amount of light or polarize the light, making it easier to see details on bright objects.**

# Colour Filters

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- Use coloured filters for observing the Moon and the planets.
  
- VLT: Visible Light Transmission**
  - The % of light allowed to pass through the filter
  
  - The lower the VLT number, the dimmer an image will appear.

# Size Matters

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- The smaller the aperture of your scope, the higher the VLT you should use.
- <40% VLT are not recommended for telescopes with an objective aperture of less than 150mm/6 inches.
- Filters can be stacked, but VLTs are compounded.

# Opinions: Do I really need colour filters?

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- No:** Most observers would be much better served by having a range of high-quality neutral density filters at their disposal (50%, 25% and 13%, for example) to reduce brightness and allow faint details to be seen instead of being washed out. Useful for planets and splitting binaries.
- Maybe:** An orange filter can help with viewing the darker Martian features when close to opposition.
- Yes:** They reduce glare and light scattering, increase contrast through selective filtration, increase definition and resolution, reduce irradiation and lessen eye fatigue.

**How do I use them?**

**Quick demo!**

# Installing a filter



- Remove eyepiece from telescope
- Thread the filter into the bottom of the barrel
- Replace the eyepiece onto the telescope
- View!

**How do I choose them?**

**Go with what works!**

**Choose the right filter  
for what you want to see!**

KEY

	Not Useful	Good	Excellent	Probably the Best		
Wratten Number and Color	Moon	Mercury	Venus	Mars	Jupiter	Saturn
#8 Light Yellow	With small telescopes			Maria, Dust clouds	Belts	
#11 Yellow-Green				Maria	Belts	Cassini Division
#12 Yellow			Improves contrast	Maria, Atmospheric clouds	Belts, Poles	
#15 Dark Yellow / Amber	Useful	Daylight	Low contrast clouds	Maria, Dust clouds, Polar regions	Belts, Poles, Festoons	
#21 Orange	Very useful	Daylight surface		Surface edge detail	Belts, Red spot, Festoons	Bands, poles
#23A Light Red		Daylight, Twilight		Maria and surface, Dust clouds, Polar caps	Blue clouds	Blue clouds
#25 Red		Daylight, Twilight	Upper clouds	Maria, Polar caps	Improves contrast	
#29 Dark Red			Terminator	Maria, Polar caps	Moon transits	Clouds
#38A Dark Blue			Upper clouds	Dust storms, Polar caps, Violet clearing	Belts, Red spot	Bands, rings
#47 Violet	Useful		Upper clouds	Clouds and haze above poles		Ring detail
#56 Light Green	Useful		Improves contrast	Dust storms, Polar caps	Red Spot	Bands, Poles
#58 Green	Useful		Improves contrast	Dust storms, Polar caps	Belts	White bands, Poles
#80A Blue	Very useful	Twilight surface	Upper clouds	High clouds, Ice caps	Rills, Festoons, Red Spot	Bands, Poles
#82A Light Blue	Useful	Twilight surface	Upper clouds	Polar caps, Surface	Belt transition	Band transition

# **What are the best filters for Mars?**

**-Let the red out**

- #8 Light Yellow - 83% VLT:** increases the detail in the maria
- #11 Yellow Green - 78% VLT:** darkens the maria
- #12 Yellow - 74% VLT:** brings out the polar ice caps, enhances blue clouds, increases contrast, and brightens desert regions 
- #21 Orange - 46% VLT:** assists in detecting dust storms
- #23A Light Red - 25% VLT:** sharpens boundaries and increases contrast 
- #25A Red - 14% VLT:** provides maximum contrast of surface features and enhances surface detail, polar ice caps, and dust clouds
- #38A Dark Blue - 17% VLT:** provides detail in atmospheric clouds, brings out surface phenomena, and darkens red areas
- #56 Light Green - 53% VLT:** enhances frost patches, surface fogs, and polar projections
- #80A Blue - 30% VLT:** provides detail in atmospheric clouds

# **What are the best filters for Jupiter?**

**–How to spot the spot**

- #8 Light Yellow - 83% VLT:** enhances detail in the belts
- #11 Yellow Green - 78% VLT:** brings out dark surface detail
- #12 Yellow - 74% VLT:** enhances red and orange features; darkens blue festoons near the equator.
- #21 Orange - 46% VLT:** brings out the Great Red Spot and sharpens contrast
- #23A Light Red - 25% VLT:** sharpens belt contrast
- #25A Red - 14% VLT:** sharply defines differences between clouds and surface features
- #38A Dark Blue - 17% VLT:** increases contrast in large scopes
- #47 Violet - 3% VLT:** recommended only for large telescopes; darkens the belts
- #58 Green - 24% VLT:** increases contrast on lighter parts of the surface
- #80A Blue - 30% VLT:** perhaps the best filter for the study of detail; enhances the contrast of rills and festoons in the cloud belts and details of the Great Red Spot.



# **What are the best filters for Saturn?**

**-Shoulda put a ring on it**

- #11 Yellow Green - 78% VLT:** brings out dark surface detail
- #12 Yellow - 74% VLT:** enhances red and orange features 
- #38A Dark Blue - 17% VLT:** increases contrast
- #47 Violet - 3% VLT:** increases contrast in the rings
- #58 Green - 24% VLT:** brings out the cloud belts and polar regions
- #80A Blue - 30% VLT:** brings out detail in belts and polar features 

# **What are the best filters for Uranus and Neptune?**

**–Get the green out**

**#8 Light Yellow - 83% VLT: increase resolution of detail**



**#11 Yellow Green - 78% VLT: improves visual detail**



**What are the best filters for  
Mercury and Venus?**

**-Tone it down!**

- #23A Light Red - 25% VLT:** stands out from the blue sky when viewed during the day
- #25A Red - 14% VLT:** reduces light glare
- #38A Dark Blue - 17% VLT:** increases contrast 
- #47 Violet - 3% VLT:** reduces glare
- #58 Green - 24% VLT:** Venutian atmospheric features 

# **What are the best filters for The Moon?**

**–Sailing on the maria**

**#8 Light Yellow - 83% VLT:** enhances detail in smaller scopes

**#11 Yellow Green - 78% VLT:** a great general-purpose filter

**#21 Orange - 46% VLT:** greatly enhances features



**#58 Green - 24% VLT:** increases contrast on the lighter parts of the surface

**#80A Blue - 30% VLT:** increases contrast



# **What are the best filters for Deep Sky Objects and Binary Stars?**

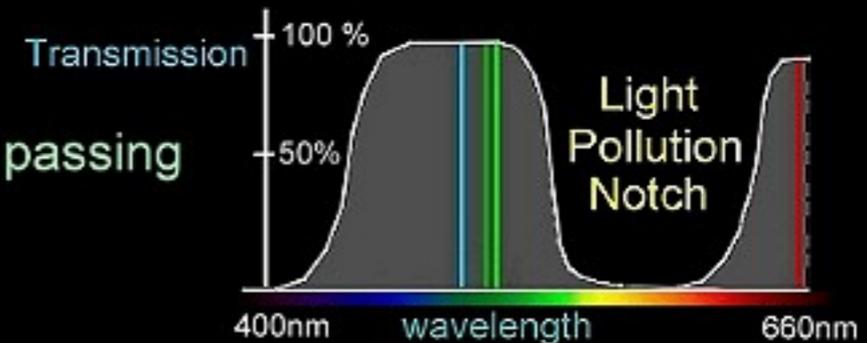
**-It's about the contrast**

# Major Filter Types

## Broad-band "LPR" Filters

Attempts to "notch-out" major skyglow bands while passing as much of the rest of the spectrum as possible.

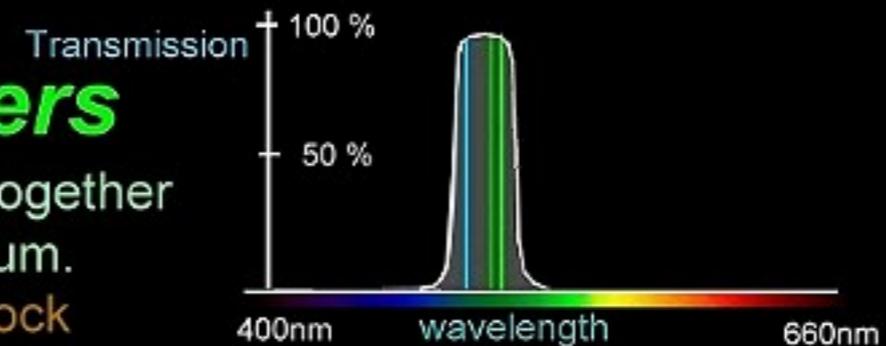
Examples: Lumicon Deep-sky, Orion Skyglow



## Narrow-band "Nebula" Filters

Only lets through the OIII and H-Beta nebula lines together while excluding most of the rest of the visual spectrum.

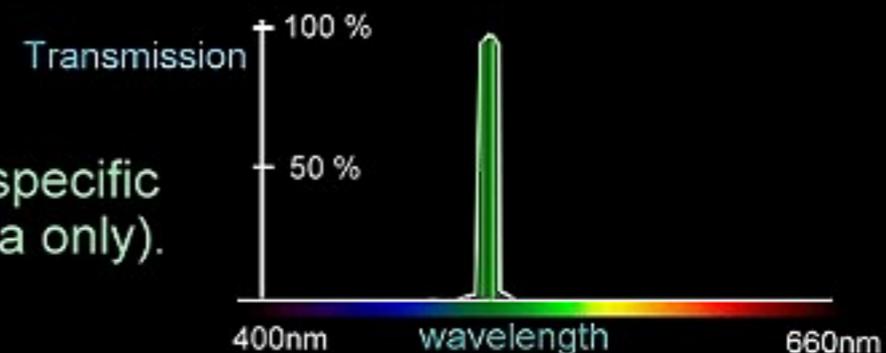
Examples: DGM NPB, Lumicon UHC, Orion Ultrablock



## Line "Nebula" Filters

Lets through only one or two spectral lines from a specific element in the nebula (OIII lines only or the H-Beta only).

Examples: Lumicon OIII, Lumicon H-Beta



# **Crystalview Moon, Skyglow, and other Broadband Filters**

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- Improves the blocking of mercury-vapour light and higher transmissions, at the critical hydrogen-alpha and hydrogen-beta lines.**
- Bright, light-polluted skies appear darker**
- The contrast between the object viewed and sky is improved**
- Best suited for viewing galaxies and star clusters, whose own light spans the entire visible spectrum**

# **Nebula Filters: Narrow Band and Line**

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- Block out most of the visible spectrum**
- Allows maximum transmission of the wavelengths most commonly emitted by nebulae:**
  - Oxygen-III filters enhance views of planetary nebulae and a few supernova remnants**
  - Hydrogen-alpha filters enhance views of emission nebulae**
  - Hydrogen-beta filters are optimal for a handful of extremely faint targets, such as the California Nebula and IC 434 (the Horsehead Nebula)**

# Neutral Density Filters

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- Can help split binaries by reducing the brightness of the primary star.**

- **#80A Blue - 30% VLT:** helps to split the binary star Antares when at maximum separation
- **#82A Blue - 30% VLT:** helps to increase structure detail when looking at galaxies