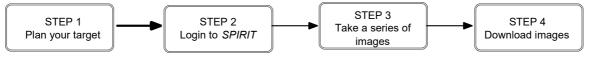
SPIRIT telescopes use monochrome (black and white) cameras for increased sensitivity. In order to create a colour image, images are acquired through red, green and blue filters, then combined using software such as Photoshop.

The same rules apply when taking filtered images as for basic imaging. Bright objects, such as star clusters, can be imaged in short exposures of 20 seconds or less. Faint objects, such as galaxies and nebulae, require longer exposures of 60 seconds or more.

These are the steps to take a colour series with SPIRIT:



## STEP 1: Plan your target

Use a planetarium program, such as Stellarium, to find out what's in the sky at the time you intend to image with *SPIRIT*. The best targets for colour astrophotography are bright nebulae.

## STEP 2: Login to SPIRIT

The SPIRIT telescopes may be accessed from <a href="http://spirit.icrar.org/telescope-access/">http://spirit.icrar.org/telescope-access/</a>

Enter your user name and password, it may ask you to login twice.

○ <b>○ ○</b> http:/	/observatory.physics.uwa.edu.au/index.asp
✓ ►	tory.physics.uwa.edu.au/index.as 💥 Loading 🗙 🔍 Google 🔄
	To view this page, you must log in to this area on observatory.physics.uwa.edu.au:80: ACP Observatory Control Your password will be sent unencrypted. Name: Password: Remember this password in my keychain Cancel Log In

figure 1: Enter your user name and password.









	http://observatory.ph	ysics.uwa.edu.au/	
Observatory Info       Basic Imaging       Advanced Imaging       Run an ACP Plan       Plan Checker       My Documents       S       Help	System Status Help Observatory offline UTC: 02:30:31 LST: 14:21:40 Owner Free Weather n/a	PA.	Authentication Required
	Show/Hide Run Log	and Abort Contr	Authentication scheme: Basic

figure 2: Enter your user name and password again, after the first web page has loaded it may ask you to login again.

The SPIRIT home page ('Observatory Info') displays three panes: System Status, Weather and Welcome. Use the left hand menu to display other pages, such as 'Take a series of images'.

UWA Obs Welcome Test User	ervatory - SPIRIT
Coservatory Info About Location Equipment System Satus Vesather Lag Off Take a Single Image Take a Single Image Take a Single Image Advanced Imaging Run an ACP Pan Pan Checker My Documents W Images	System Status         Telescope offline         Offline       Activity         Offline       Offline         Offline       Offline         Offline       Offline         Offline       Offline         Offline       Colspan="2">Offline         Offline       Colspan="2">Offline         Offline       Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2"Colspa="2"Colspa="2"Colspa="2"Colspan="2"Colspan="2"Colspan="2"Colspa="2
Ny Observing Plans My Run Logs Help S Welcome Getting Stantod Imaging FAQ Making Obs. Plans Using FTP Downloads Contact	Weather         Heip         Click refresh to update sky conditions.         Sky Temp       -24.6 deg C         Ambient Temp       27.4 deg C         Sky Tomp       -24.6 deg C         Ambient Temp       27.4 deg C         Sky Tomp       -24.6 deg C         No       Dropa detected?         No       Wind Speed         Wind Speed       3 km/h         Humidity       42 %
	Welcome Welcome to the SPICE Physics ICRAR Remote Internet Telescope (SPIRIT) hosted at The University of Western Australia. If you haven't been here before, click the Getting Started Item in the side bar for some useful information on how the content on this site is presented. Be sure to check the Weather status before you proceed with any imaging.

figure 3: SPIRIT home page









## STEP 3: Take a series of images

Select Take a series of images from the left hand menu.

Basic Imaging     Imaging       Take a Single Image					
Take a Series of Images					
Take a Series of Images	fold	close	close-others	refs-	jum
Take a Series of Images					
Target Name: Get Coordinates					
Right Asc. (hrs):					
Declination (deg): (coordinates in J2000)					
Use Count Filter Duration Binning					
Clear \$ 1 \$					
Clear \$ (1 \$					
Clear \$ 1 \$					
Clear \$ 1 \$					
Add more					
Acquire Images					

figure 4: Select 'Take a Series of Images' from the left hand menu.

1. Enter your target name. Be sure to leave a space between the catalogue and number (eg 'ngc 4755', not 'ngc4755').

Help			
Target Name:	Mg8 4755 🦊	Get Coordinates	
Right Asc. (hrs):		1	
Declination (deg):		(coordinates in J2000)	
Use Count	Filter Duratio	n Binning	
o 🔽 🖸	ear 🛊		
	ear 🛊	1:	
C []	ear 🛊		
ା 🔄 🖸	ear 🛊		
Add more			

figure 5: Enter your target name.



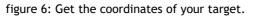






2. Select **Get Coordinates**. This will automatically put values into fields for 'Right Asc.' (RA) and 'Declination' (Dec).

Help			2		
Target Name:	ngc 4755	Get Coordinates			
Right Asc. (hrs):	12:53:35.88				
Declination (deg):	-60:21:00.0	(coordinates in J2000)			
Use Count	Filter Duratio	n Binning			
	ear 🛊	1 🛊			
	ear 🛊				
	lear 🛟	1 🛟			
	ear 🛊				
	1.1.0003.000.00				



3. Enter values for Count (the number of images to be taken), Filter and Duration (exposure length). Leave Binning set to its default value ('1' for SPIRIT I and '3' for SPIRIT II).

Take a Se	eries of Imag	jes	fold	close	close-others	refs▼	jump
Target Name: Right Asc. (hrs) Declination (deg	ngc 4755 12:53:35.88 a): -60:21:00.0	Get Coordinates (coordinates in J2000)					
Add more	Filter     Duratio       Red     10       Clear     10       Red     10       Green     Blue       H-a     B       V     R       Emtpy     Emtpy	Binning 1; 1; 1; 1; 1; 1;					

figure 7: Select exposure details, such as filter choice, for each image set.







4. Select **Add more** to create additional rows, if required. Figure 8 shows *SPIRIT* programmed to capture three images at 10 and 15 second durations for the red, green and blue filters. This will produce 18 images in total.

Hel	p			
Targ	get Name:	ngc 475	55	Get Coordinates
Righ	nt Asc. (hrs):	12:53:38	5.88	
Dec	lination (deg):	-60:21:0	0.0	(coordinates in J2000)
Use	Count Re		period and a second	Binning
2		reen 🛊	10 10	
•	3 B1	ue 🛟	10	1.
	3 Re	ed 🛟	15	1:
☑	3 Gr	een 🛟	15	
☑	3 B1	ue 🛟	15	
Ad	d more			

figure 8: Add as many rows as required.

5. Select Acquire Image when you have finished adding exposure details. The sequence of commands to take the images will now commence. You can monitor progress in the 'System Status' pane. Select Show/Hide Run Log and Abort Control to expand the progress window.

Obs	ervatory	Т	elescope	lm	ager	A	ctivity
In use		Stop	ped	Shutter	Closed	Observing	
UTC:	15:02:32				225	Target	M31
LST:	00:18:01		03:04:32.04				
Owner	Paul Luckas		-25°13'21.2"	-			
Weather	Clear Wind		090.32°	Cooler	-15°C/49%		
Shutter	Open		53.06°				
Dome	Slave		1.251				
Stop Run	e Run Log ar	nd Abo					• .
Stop Run	was generate	nd Abo		1			age previev ee larger im
For: Location: Coords: Targets:	a was generate Adminis Perth, Lat = - 7	d by Ad trator Austra 31° 56	Drt Control	1			• .
This plan For: Location: Coords: Targets: Start Ima	a was generate Adminis Perth, Lat = -	d by A0 trator Austra 31° 56 8 (100	Drt Control	1			• .
This plan For: Location: Coords: Targets: Start Ima Total Tim User Comm	Adminis Perth, Lat = - 7 iging: 23:40:1 e: 00:36:3 ments: Test Plan 14	d by Ac trator Austral 31° 56 8 (loc 3	DP Planner 4.1.	1 - 5° 50' 00"			• .
This plan For: Location: Coords: Targets: Start Ima Total Tim User Comm	Mas generate Adminis Perth, . Ist =	d by Ac trator Austral 31° 56 8 (loc 3	DP Planner 4.1. <sup>11a</sup> <sup>100</sup> Lon = -11 <sup>11a</sup> <sup>11a</sup>	1 - 5° 50' 00"			• .

figure 9: Monitor the progress of image acquisition.









## STEP 4: Download images

Once imaging is complete, a low quality image thumbnail appears in the 'System Status' pane. Select the image to enlarge the view.

	servatory - SPIRIT	
Welcome Test User		
Observatory Info About Location Equipment System Status	Sys Hei	
Weather Log Off Basic Imaging 🔊 Take a Single Image		
Take a Series of Images Advanced Imaging	o w	
Plan Checker My Documents My Images	· · ·	nage
My Observing Plans My Run Logs Help	Shc	
Welcome Getting Started	Help	

figure 10: Preview your image.

Your images are best accessed by FTP rather than attempting to download the images from the telescope web interface. Please contact us for the FTP server addresses or for help with FTP.







