# Summary of Pixinsight DSLR processing workflow

Pixinsight Essentials

1. When you load an image it may look totally black. Apply an STF Autostretch (Ctrl-A). Don't worry if it looks horrible – this isn't permanent!. To turn autostretch off again click this button on the main toolbar.

2. Most of the functions mentioned below are found on the Process menu. You can just go to Process/<All processes> to find them - or search through the bazillions of menu choices.

3. To Apply a process, sometimes you click the Tick on the bar at the bottom of the tool's window,
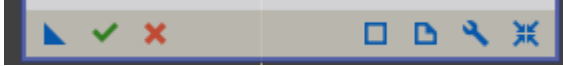
    and sometimes you click the SOLID Square (nb not the Empty one, that edits the code!).

4. To reset a process/action to its default settings click the Four-Inward-Arrows icon on the right of the bar.

5. The Empty Circle will show you a realtime preview of your proposed actions. It can be very slow though.

6. **If you apply a change and don't like it, Ctrl-Z will undo it.**
   Or you can go to the History Explorer (on the left side of the screen, it will fly out), and click to some previous point in the history.

7. If the instructions tell you to "Drag a New Instance" from one tool to another, grab the Solid Triangle from the source tool's bar and drag it onto the the target tool's bar. This will copy the relevant settings from one to the other.

Minimum processing

- **DynamicCrop** to remove stacking artefacts
  - Save the cropped image and close the original

- **DynamicBackgroundExtract to remove gradients and noise**
  - Click on your image
  - Go back to the tool
  - Sample Generation section: set radius 15, samples per row 25
  - Model Params (1): min weight 0.1, tolerance 1
  - Click Generate all
  - You want to get points all over the image, right into the corners
  - So Play with tolerance level till you have it.
  - Then click on any points on your target or on stars and delete them.
  - You can add extra points by clicking.
  - Target Image correction: correction = subtraction, discard background model
  - Apply
  - do it again if you want to, maybe play with smoothing factor
  - save 32bit or 64bit fits _DBE

- **Stretch – included here for reference if doing the bare minimum but do this last after any noise reduction etc!!**
  - Open **HistogramTransformation**
  - Click on "no view selected" and pick your target.
  - Click the Realtime Preview circle.
  - use middle slider under the graph to stretch the histogram
  - use left slider to adjust black point
  - Watch the realtime preview to see the effect
  - When all happy, close realtime and click Apply.
  - Save as 32-bit FITS.

- **Noise Reduction using AtrousWaveletTransform and MultiscaleMedianTransform**

  - Right click on the image, and Duplicate it.
  - Select the duplicate
  - open **ScreenTransferFunction** process.
  - Click the Autostretch button (looks like a radiation hazard sign)
  - Open **HistogramTransformation** process
  - Drag a New Instance from STF to HT, then apply to the clone.
  - Close STF and HT tools.
  - This creates a Mask we can use to smooth the target.

  - Select original image
  - press Ctrl-M, select the clone as a mask, and tick Invert.
  - The target will 'go red' this tells us where the mask is being applied.

  - Open the **AtrousWaveletTransform** process.
  - Select layer 1 then tick Noise Reduction and set the Threshold to 4 and iterations to 3
  - Repeat for layer 2 using 2, 2
  - Repeat for layer 3 with 1,2 and finally for layer 4 with 0.5,1
  - Apply.
  - Press Ctrl-K to hide the mask. You *should* see that the image is less noisy.
  - You can reapply the same settings if you want more smoothing / denoising.

  - You can also use **MultiscaleMedianTransform** to denoise.
  - Same approach, you can use the same mask.
  - On the MMT window, just set the thresholds to 4, 2, 1 and 0.5. Leave everything else as-is.
  - Apply.

Getting Fancy

Do a Dynamic Crop and Background Extraction as above, then process RGB and L separately:

Create Luminance copy

- **ChannelExtraction**
- Select L*a*b, untick a and b, execute and save as _L (luminance image)
- Save the _L image

Recombine L and RGB to make LRGB
- **LRGBRecombination**
- select RGB image
- uncheck RGB, select luminanceimage in L
- tick chrominance make sure channel weights are all 1
- adjust saturation
- apply, use Ctrl-Z to undo and try different settings

final adjustments
- Use **CurvesTransformation** to tweak

More details

Process RGB image

- create two previews, one on background one on nebula
- BackgroundNeutralisation, use the previews
- ColorCalibration, use the previews
- save as _ColorCal
- delete preview boxes

- duplicate image (right click)
- reset STF
- select *original* image
- Open ScreenTransferFunction tool, click autostretch
- open HistogramTransformation, drag STF new instance to bottom bar of HT
- click the duplicate image and apply stretch
- Close STF and HT

remove noise

- Add inverted mask, using duplicate image
- AtrousWaveletTransform 4,3 2,2 1,2 0.5,1
- MultiscaleMedianTransform - similar settings
- remove mask
- HistogramTransformation - stretch till looks good (use realtime preview, reset after each go)

- create another luminance copy to use as a mask
- invert mask
- AtrousWaveletTransform on layers 1&2 only
- ACDNR stdDev2 amt 1
- remove mask

- RangeSelection play with lower limit to clean up large-scale fuzzy patches
- click apply to create new mask image
- apply mask to original and invert
- AtrousWaveletTransform, restore CIE Y, layers 7, act on layer 1,2,3 only
- remove mask
- Histogramtransformation, play with black slider

- blur - AtrousWaveletTransform Reset, disable all layers apply twice
- save as _Blurred

Luminance processing

- follow RGB till after ACDNR but don't do background neutralisation or colorcal – no point on mono image!
- StarMask - scale 7, large scale 0 smoothness 8
- RangeSelection - fuzz 0.15 smooth 5, play with lower limit till nice
- apply

- PixelMath RGB/K range_mask+star_mask
- destination new image
- blur x3 using AtrousWaveletTransform with no layers ticked
- apply as inverted mask to Luminance image
- invert mask

- LocalHistogramEqualisation kern rad 200 contrast limit 1.5ish 8bit
- hide mask with Ctrl-k to view results
- play till nice
- repeat with different settings - 48, 1.5, 10bit

- try HDRMultiscaleTransform
- try AtrousWaveletTransform
- save as _Enhanced

bingo!