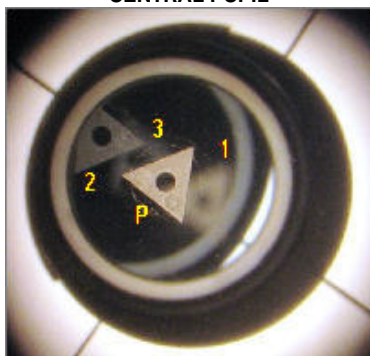# Using the *INFINITY XLKP*™ w/Triangle Spot

ALL PICS & ILLUSTRATIONS COMPLIMENTS OF JASON KHADDER
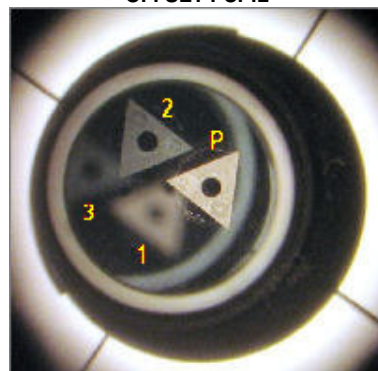
Identification of the Four Center Spot Reflections*

*Equal-sized images as illustrated & best results are achieved with the focuser/autocollimator racked in/out appropriately to place the autocollimator mirror at or very near the focal plane.
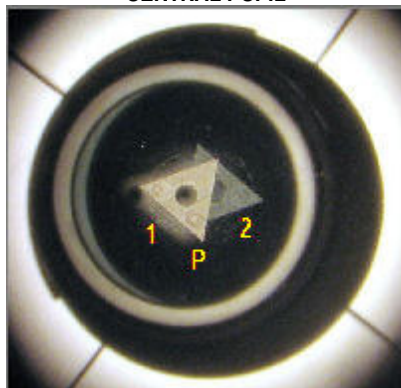
CENTRAL PUPIL

OFFSET PUPIL

- Reflection **"P"** is the sharpest and brightest of all the rest.
- Reflection **"1"** is oriented like **"P"** but is typically somewhat fuzzy.
- Reflection **"2"** is the sharpest and brightest inverted reflection.
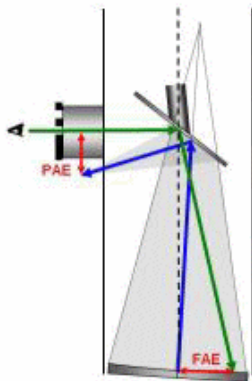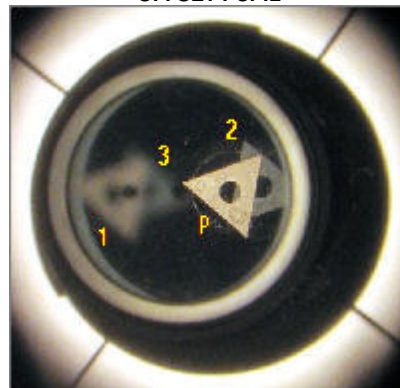- Reflection **"3"** is the dimmest inverted reflection & is somewhat fuzzy.

STEP 1: Assessing Overall Optical Axes Alignment:

CENTRAL PUPIL

OFFSET PUPIL

- Insert the *INFINITY XLKP*™ in the focuser & examine both pupil views.
- Axial alignment errors will likely be present as depicted.
- The objective will be to have only **"P"** be visible via the CENTRAL pupil & and "Perfect" twin hexagrams via the OFFSET pupil. Anything else is indicative of axial misalignment.

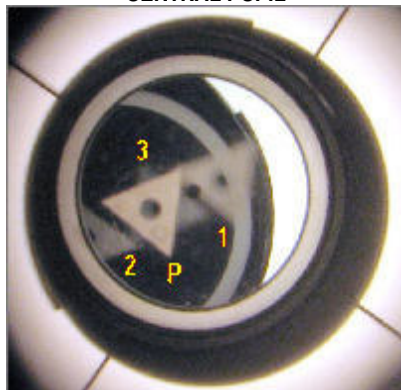## There are two types of axial alignment errors:

- **FAE (Focuser Axial Error)** is the distance between the primary mirror center point and the focuser axis.

- **PAE (Primary Axial Error)** is the distance between the primary mirror focal point and the focuser axis.

Eliminating both errors is the main goal of "axial" collimation. Typically, FAE is eliminated first by adjusting the secondary mirror then PAE is eliminated by adjusting the primary mirror.

Using the *INFINITY XLKP*™ w/Triangle Spot

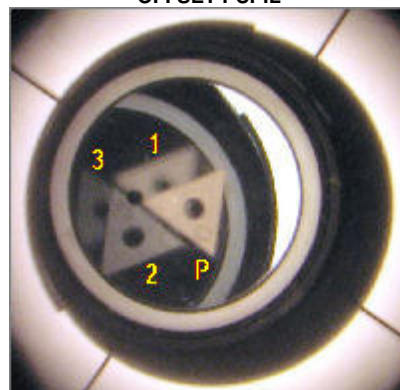## STEP 2: Assessing FAE

CENTRAL PUPIL

The "Carefully Decollimated Primary (CDP)" protocol was pioneered by Vic Menard
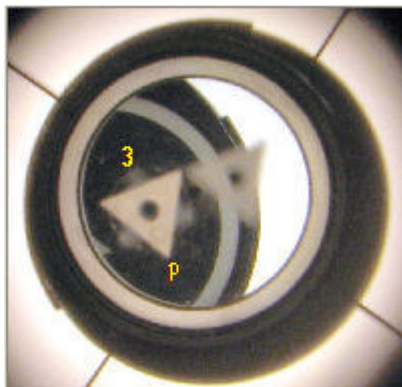

Using the CENTRAL pupil only:

Intentionally de-collimate the primary mirror by slightly adjusting one of the 3 cell collimation knobs until reflections "**1**" and "**2**" are sufficiently separated to clearly see "**P**" and "**3**"

OFFSET PUPIL

STEP 3: Eliminating FAE by adjusting the secondary mirror:
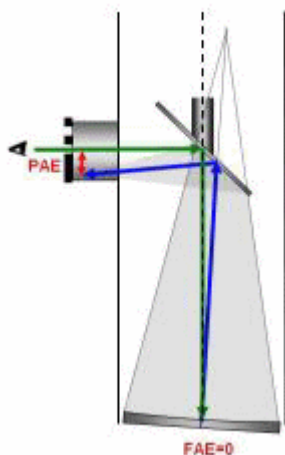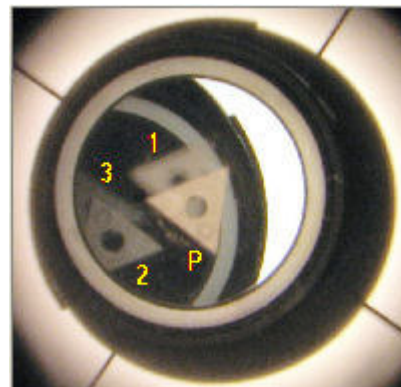
CENTRAL PUPIL

Using the CENTRAL pupil only:

Adjust only the secondary mirror until reflections "**P**" and "**3**" stack forming a prefect hexagram -- an indication of FAE elimination.
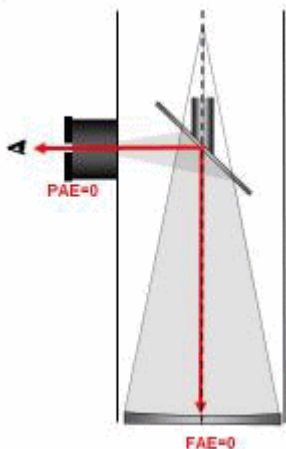
OFFSET PUPIL

Stacking reflections "**P**" and "**3**" via the central pupil using the CDP eliminates FAE.

XLKP-Triangle, 7/5/2014

Using the *INFINITY XLKP*™ w/Triangle Spot

STEP 4: Eliminating PAE by adjusting the primary mirror:

- Remove the *INFINITY XLKP*^TM autocollimator and replace it with the *BLACKCAT XL*^TM Cheshire (or similar PAE alignment tool).

- Adjust only the primary mirror until Reflection "**P**" is perfectly centered in the Cheshire ring (or the return shadow of the center spot is centered on the Barlowed laser return screen).
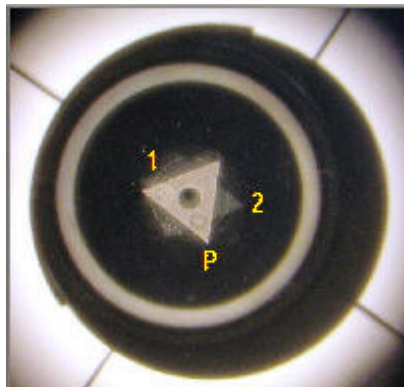
CHESHIRE VIEW

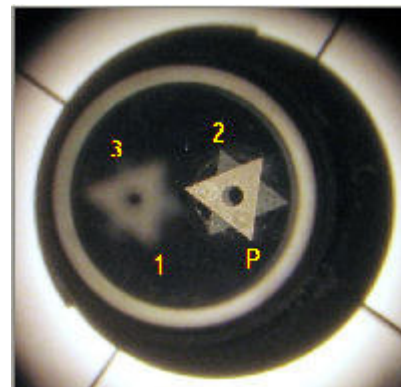**Centering reflection "P" using the Cheshire (or similar PAE alignment tool) eliminates PAE.**

STEP 5: Checking for residual errors:

CENTRAL PUPIL

- Re-insert the *INFINITY XLKP*^TM and check reflections via both pupils.

- If your see residual background ghosts via the CENTRAL pupil and/or imperfect hexagrams via the OFFSET pupil then you still have residual axial alignment errors.

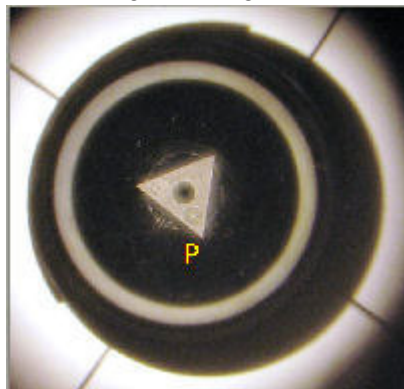**OFFSET PUPIL**

XLKP-Triangle, 7/5/2014

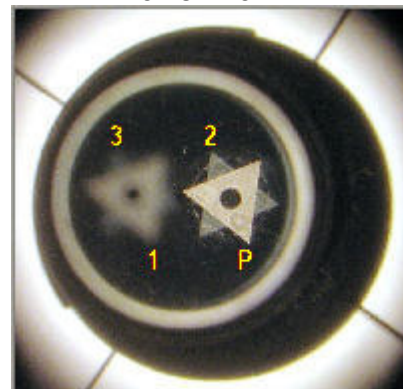# Using the *INFINITY XLKP™* w/Triangle Spot

STEP 6: Correcting residual errors:

If residual errors persist, most likely you have inadvertently left a small FAE error at the CDP step.

CENTRAL PUPIL

OFFSET PUPIL

- **Repeat the CDP (step 2) with more precision by ensuring reflections "P" and "3" form a perfect hexagram in the CENTRAL pupil and redo steps 3 - 5.**

- **After carefully repeating steps 2 – 5, ensure only reflection "P" is visible in the CENTRAL pupil and perfect hexagrams appear in the OFFSET pupil.**

- **Re-check for PAE elimination using the *BLACKCAT XL™* (or similar PAE alignment tool).**

STEP 7: If errors still persist, try this iterative adjustment approach:

- **Using the CENTRAL pupil, eliminate all inverted background ghost reflections with only "P" remaining by only adjusting the PRIMARY Mirror.**

- **Using the OFFSET pupil, stack reflections "P" and "2" to form a perfect hexagram by only adjusting the SECONDARY mirror.**

- **Iterate back and forth between adjustments of the two mirrors as necessary; usually 4 or less iterations is required.**

Successful Axial Convergence and What it Means!

If "all" tools simultaneously yield "textbook" visual queues, optical axes convergence has been accomplished. With sustainment of these adjustment settings, you can be confident that your scope will perform to its maximum image-detail-delivering potential that atmospheric "seeing" will allow.