

\* "Secular Light Curve of Comet 107P/Wilson-Harrington in the 2009 Apparition" <http://webdelprofesor.ula.ve/ciencias/ferrin>

\*\*\*\*\*

## ALERT UP TO 091202 COMET 107P/WILSON-HARRINGTON, EVIDENCE OF ACTIVITY

Comet 107P/Wilson-Harrington is a comet-asteroid transition object that exhibited activity in 1949 and has remained inactive ever since. In the Atlas of Secular Light Curves of Comets:

<http://arxiv.org/ftp/arxiv/papers/0909/0909.3498.pdf>

this object has a photometric age of 760 comet years, which implies that it is a methuselah comet (age > 100 cy), thus it must be very near to extinction and its activity, if any, must be very feeble. **Observations published after Nov. 16th, +23 days after perihelion show an enhancement of + 0.77 mag.** The enhancement in 1949 was 0.74 mag, and in 2005 was 0.52 mag. The plot showing the enhancement in 2009 is :

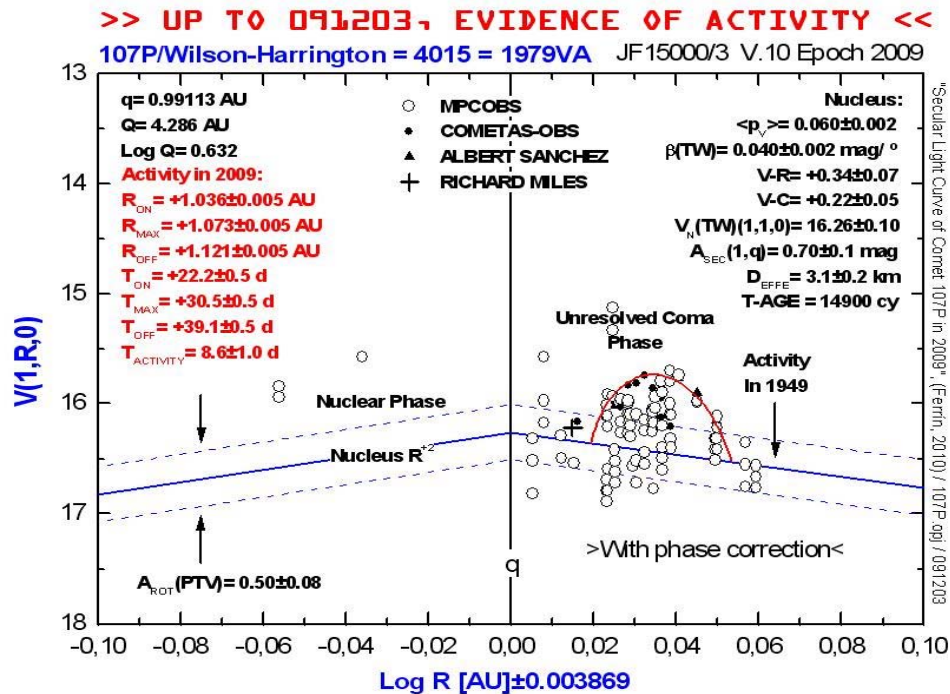


Figure 1. The above plot is the secular light curve of comet 107P in the 2009 apparition. **There is evidence of activity after November 16th, +23 days after perihelion, of maximum amplitude +0.70 magnitudes.** Notice that the activity is decreasing, so the comet may return to nuclear in a few more days. See text.

The enhancement looks real because is based on photometry using the CMC = Carlsberg Meridian Catalogue 14 which claims a photometric error of  $\pm 0.17$  mag at the level of magnitude 17th, and because the photometry comes from several independent observers and observatories.

**However, the comet is not going to exhibit a coma because the amplitude of the enhancement is below the Threshold Coma Magnitude, TCM.** TCM is defined in the *Atlas*, and has a current value of  $3.0 \pm 0.3$  magnitudes. If a comet has an enhancement below TCM **\*above\*** the nucleus, then the comet has a coma but it is contained within the seeing disk and will not be detected. The only exception may be if the comet is imaged in a very large telescope, with very good seeing, and in a very deep exposure.

### **Situation up to 091129**

The secular light curve up to 091129 is shown in Figure 1.

**The good news** is that the activity is well defined.

**The bad news** is that the activity seems to be fading away. So the comet may be inactive in about 10 days, or December 9th, approximately.

We can sum up the circumstances of this apparition in a very very preliminary way, thus:

Turn on point =  $\sim +22.2$  d after perihelion

Turn off point =  $\sim +39.1$  d after perihelion

Time active =  $\sim 9.8$  days

Amplitude of the activity =  $\sim 0.70$  magnitudes

It is then possible to determine the Time-AGE defined in the *Atlas*. The formula is:

$$\text{T-AGE} = 90240 / [ \text{Asec} \cdot \text{Tactive} ] \text{ comet years}$$

**T-AGE = 14900 comet years (!)**

Notice that in the *Atlas* 95% of the comets listed have T-AGE  $< 100$  cy. Thus this comet is an exceedingly old object, in fact a methuselah comet of great interest. At the present moment holds the record as the oldest comet in our data base.

### **Conclusion**

What is needed at this stage is **high precision photometry** to confirm or discard this activity and to quantify the enhancement and the turn off point. There is a nice comparison area (3C454.3)  $15^\circ$  from the comet by González-Pérez et al. (An. J., 122, 2055-2098) located at RA22h 53m 58s, DEC+16° 08' 54", containing UVBRIJHK photometry. The comet exhibited activity +42 d after perihelion in

1949. The corresponding date in 2009 is December 3rd. High precision photometry is encouraged.

**Ignacio Ferrín,  
Center for Fundamental Physics,  
University of the Andes,  
Mérida, Venezuela.**

+++++