

The Professor Comet's Report ¹



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Comet Garradd C/2009 P1 & Brocchi's Cluster

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Welcome to the comet report which is a monthly article on the observations of comets by the amateur astronomy community and comet hunters from around the world! This article is dedicated to the latest reports of available comets for observations, current state of those comets, future predictions, & projections for observations in comet astronomy!

Early Autumn – October 2011

The Current Status of the Predominant Comets for Oct 2011!

| Comets | Designation (IAU - MPC) | Orbital Status | Magnitude Visual | Trend | Observation (Range in Lat.) | Constellations (Night Sky Location) | Visibility Period |
|-----------------------------|-------------------------|----------------|------------------|-----------------------|-----------------------------|--|-------------------|
| Garradd | 2009 P1 | C | 7.0 | Getting Brighter | 70°N - 60°S | SE region of Hercules (Soon to be moving Northward) | Best Evening |
| Honda - Mrkos - Pajdusakova | 45P | P | 7.0 | Steady | 55°N - 30°S | <i>Undergoing a wide retrograde motion! Currently the comet is north of Hydra heading NE towards Leo</i> | Early Morning |
| LINEAR | 2011 M1 | C | 9.5 | Fading | 70°N - 55°N | Eastern Region of Leo (Heading southward!) | Early Morning |
| Hill | 2010 G2 | C | 10 | Bright | 70°N - 5°N | Moving across Lynx and heading in a SW direction to Auriga | Morning |
| Elenin | 2010 X1 | C | 10.5* | Unknown | 45°N? - 75°S? | <i>Possible Disintegration of the cometary nucleus!</i> | N/A |
| Gibbs | 2011 A3 | C | 10 | Steady | 45°N - 35°S | Moving East from Virgo to Serpens Cauda/Ophiuchus | Early Evening |
| Gehrels 2 | 78P | P | 12 | Brightening | 65°N - 55°S | <i>Western Pisces (Undergoing retrograde motion in 'The Circlet')</i> | All Night |
| Schwassmann - Wachmann 1 | 29P | P | ~13 | Fading with variation | N/A | Undergoing Solar Conjunction! | N/A |
| Van Ness | 213P/2009 B3 | P | 13.5 | Steady | 60°N - 55°S | Eastern Aquarius thru NW region of Pisces <i>(Retrograde motion in the same region starts in late Aug!)</i> | Best Morning |

*Last confirmed sighting of Comet Elenin was on Sept 14! Any further attempts at observation have failed!

Ephemeris Data Terminology

| <i>Ephemeris Term</i> | <i>Definition (plus additional comments)</i> |
|-----------------------|--|
| Date | Month and Year using the standard Gregorian calendar. |
| TT | Terrestrial Time (Day of the Month) as a substitute for the astronomical Julian date. |
| RA (2000) | Right Ascension based on the Epoch J2000 (longitudinal coordinate for the celestial sky) measured in hours, minutes, and seconds. |
| Dec (2000) | Declination based on the Epoch J2000 (latitudinal coordinate for the night sky) measured in degrees, arcminutes, and arcseconds. |
| Delta | The distance from Earth measured in AUs (1 AU = 1 Astronomical Unit = 92 955 807 mi = 149 597 871 km as the mean distance between the Earth and Sun). |
| R | The solar distance measured in AUs (the distance between the comet or comet - like body and the Sun)! |
| Elongation | Solar elongation which is the angle of separation between the observed object and the Sun as measured across the night sky as measured in degrees. |
| Phase | Phase angle between the Sun, the celestial object, and the observer on the surface of the Earth. Also known as the Sun - Object - Observer angle. |
| M1 | M1: The visual magnitude of the celestial object as observed on the surface of the Earth at sea level. <i>(Note M1 values predicted by the Minor Planet Center can differ from actual visual reports obtain in the field!)</i> |
| M2 | The nuclear magnitude of the Comet which is also the visual magnitude of the false nucleus. |
| "/min | The progression or motion across the sky as measured in arcseconds per minute. |
| P.A. | Position angle while undergoing motion in the celestial sky. <i>(P.A. is the same method applied to binary stars with starts at N goes counterclockwise in an easterly direction!)</i> |
| Moon Phase | <i>A Numerical value for designating the phases of the Moon on a scale of (0.00 - 1.00): A New Moon = 0.00, Half Moon (1st or Last Quarter = 0.25, Waxing or Waning Gibbous Phase = (0.01 - 0.99), and a Full Moon = 1.00</i> |

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Degree of Condensation (DC)

All observations of comets are broken down into three factors: estimating magnitudes for light curves to predict future brightness, coma observations, and observations that concern with a comet's tail(s). For the coma or a comet's head there two characteristic features that are important for study: Degree of condensation (DC) and coma size measured in arcminutes. The classification system for determining the DC is based on a positive integer system from 0 to 9 as shown below.

| <i>DC value</i> | <i>Definition to numerical DC designation</i> |
|-----------------|---|
| 0 | <i>Diffuse coma of uniform brightness</i> |
| 1 | <i>Diffuse coma with slight brightening towards center</i> |
| 2 | <i>Diffuse coma with definite brightening towards center</i> |
| 3 | <i>Centre of coma much brighter than edges, though still diffuse</i> |
| 4 | <i>Diffuse condensation at centre of coma</i> |
| 5 | <i>Condensation appears as a diffuse spot at centre of coma – described as moderately condensed</i> |
| 6 | <i>Condensation appears as a bright diffuse spot at centre of coma</i> |
| 7 | <i>Condensation appears like a star that cannot be focused – described as strongly condensed</i> |
| 8 | <i>Coma virtually invisible</i> |
| 9 | <i>Stellar or disk like in appearance</i> |

A Synopsis of the Predominant Comets for Autumn 2011!

The autumn season is here and comet Garradd appears to have peaked in its brightness and presence in the evening, western skies within the constellational region of Hercules. The comet has been reported at visual magnitudes ranging from 6.7 – 7.5 depending on the condition of the coma which now has an averaged DC value of 4; it means that the coma is starting to becoming more diffuse with a predominant central brightness having a stellar visual magnitude of ~6. Garradd's coma also appears to have increased in size with its angular diameter at a presently narrow range of 12" – 13" giving the coma a size equivalent to about 16% – 19% the average size of a full Moon. The tail of the comet appears to be fan-shaped with the appearance of two dusty-like tails that extend up to a degree from the outer coma; fan – like projection emanating from the coma will be the easiest component of the comet's tail's to observe when seen in moderately dark skies. For the rest of the cometary debris (meaning the two tails streaking out from the coma past the fan-like structure) one must be in very dark skies to get a better view and see any details against the background sky to get a better perspective of the overall nature of C/2009 P1. When it comes to observing the whole of comet Garradd combining the tail with the now ever, dispersing coma gives us a net visual magnitude of about 8! If one is interested in solely observing the tail(s) of P1 Garradd; the tail(s) have grown from estimations of 0.5° - 0.63° during the final week of September to its' present size of 1° (~2 full Moons end to end) and the PA reported has varied between 90° - 125°. Right now the comet is expected to remain at its' peak brightness with only a small window of opportunity for it to reach higher brightness values in the range of 6 – 6.5 through the remaining months of this waning year and well into the winter months of 2012!

C/2009 P1 Garradd is currently moving westward through the SE region of Hercules into early November at a declining rate from 61.2"/hr on 1 October to a slow crawl (11.4"/hr) during the nights of 13 – 16 November and then will make a gradual progression northward from a PA of 326.1° on 17 Nov to PA of 0° the night of 10/11 December. Expect the comet to then graze thru the eastern region of Hercules as it moves northward, but distinctly east of the Keystone (the central asterism of Hercules) while maintaining a general PA of 0° between the dates of 10 – 22 December. Around this time and overlapping with the dates of 20 – 27 December, Garradd will reach perihelion with a distance of 1.551 AU (231.8 million km or 144.1 million mi) from the Sun. Therefore the comet will only get as close to the Sun roughly equal to the average distance the planet Mars is from our mother star! Further data analysis of the orbital elements of comet Garradd place its' perigee with the Earth at 1.266 AU (117.6 million mi or 189.2 million km) on the nights of 4 – 6 March 2012 when it is predicted by the IAU minor planet center to remain at a visual magnitude of 7.1. Continued gathering of photometry data and comparison with the light curve of C/2009 P1 from the previous months of 2011 still predicts a continuation of the comet's brightness well into the Spring 2012. The original prediction of the comet reaching maximum visual brightness during the period of 11 – 24 February 2012 is still set, but with only a small change of the comet getting half a magnitude brighter for the coma then the original value set at 7.0.

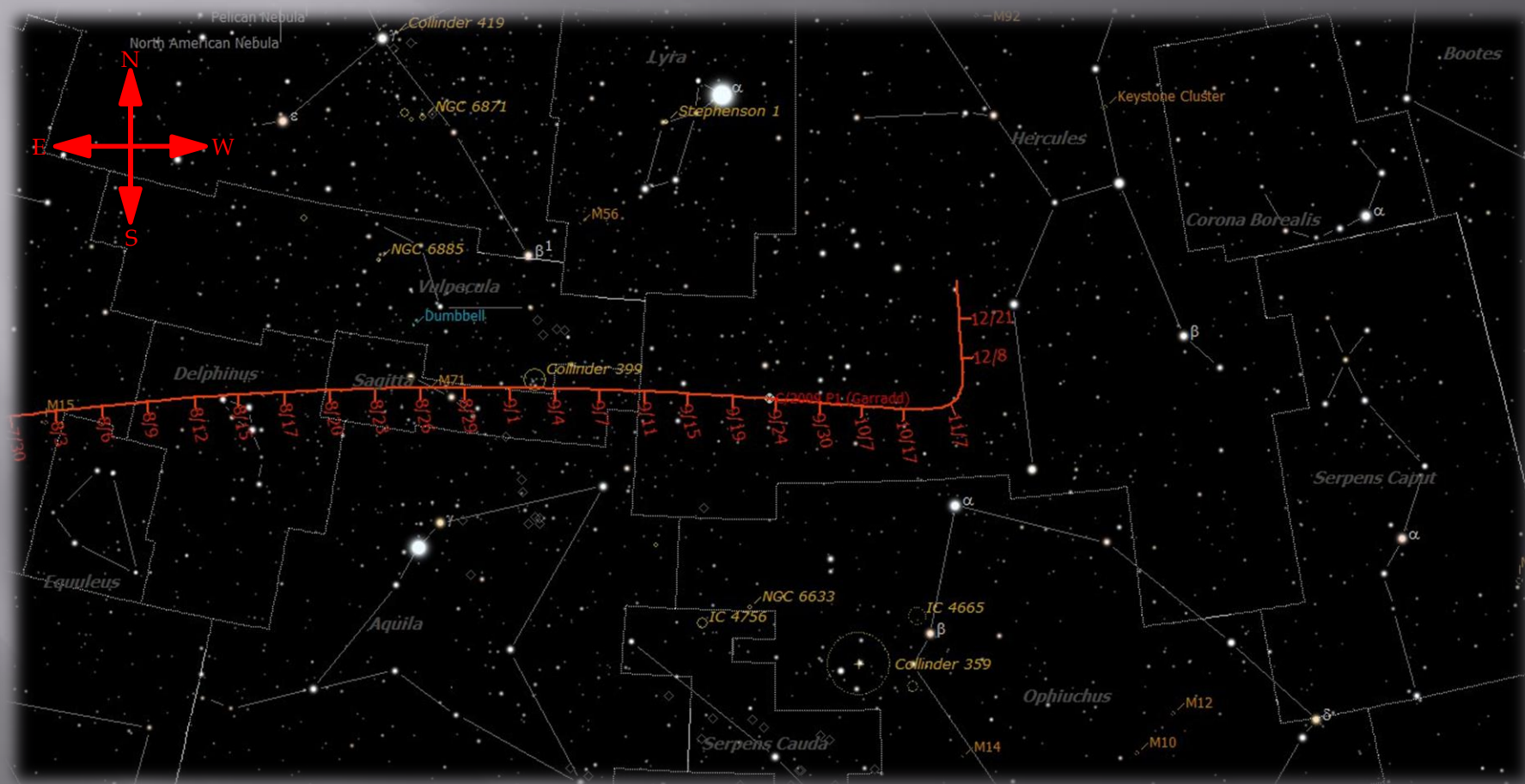
A Synopsis of the Predominant Comets for Summer 2011!

Comet 45P/Honda-Mrkos-Pajdusakova is becoming another great surprise with the latest visual observations from the field have reported visual magnitude values between 6.4 – 7.0 as the comet progresses westward from southern region of Leo towards the southern areas of Virgo. In particular 45P will be positioned in the general location very close to the planet Saturn between the stars of Spica and Porrima between the nights of 26 November thru 4 December when the constellations of Leo and Virgo will become more visible in the earlier hours of the morning night skies once the Sun begins its track thru the constellation of Sagittarius. Currently the comet is only visible during the mid morning hours close to dawn with the DC reported at 6 – 7, an angular diameter of 3' – 4' (1% - 2% the size of the full Moon), and a very dispersed tail between 0.4° - 0.6° in length at a currently fixed PA of 290°. It is best to see the comet now as it is expected to get fainter already past both perihelion and perigee during the summer/autumn seasons of this year. The expectation for Comet Honda is to dim below 10th visual magnitude by mid-October and fade further to mid-16th magnitude by the time it is expected to graze by Saturn on its northern edge! All other comets currently present in the night sky right now are expected to remain below 10th magnitude (barring some unforeseen discoveries or unexpected outbursts) for the remaining months of 2011 and possibly well into the late Winter/Early to Mid Spring 2012!

Note of interest in regards to 213P/Van Ness which has seen many fragmentations over the past month or two. Among fragment B first discovered on 5 August by the Falkes Telescope North with a present visual magnitude of 20.0, two other fragments have been discovered during the later weeks of September: fragments C and D. These two fragments have been observed or digitally imaged at visual magnitudes ranging from 21 – 22. All of the fragments were measured to be only a few arcseconds across and are trailing behind the comet last reported with a PA of 239° with respect to the central condensation of the comet and following along the comet's tail. Van Ness is presently undergoing retrograde motion between NE region of Aquarius and 'the circlet' asterism in the NW region of Pisces from now until 22 December 2011!

C/2009 P1 Garradd

Figure 1: Garradd P1 projected path during the Autumn Season of 2011!

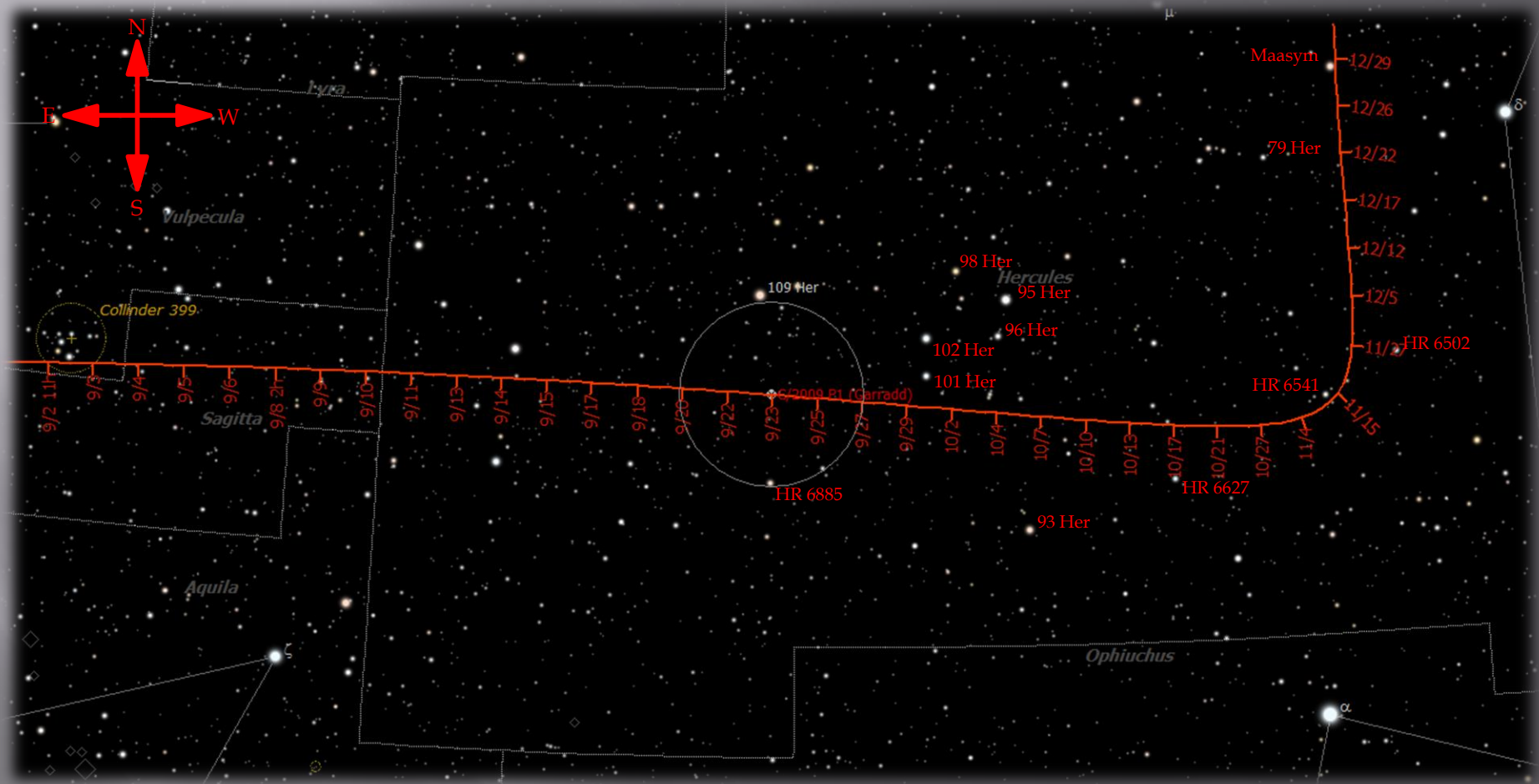


Courtesy of SkyTools 3 Profession Ed, 2011.

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C/2009 P1 Garradd

Figure 2: Close up of Garradd P1 projected path from 2 Sept - 30 Dec 2011!



Courtesy of SkyTools 3 Profession Ed, 2011.

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Bright Stars in Hercules along the Autumnal/Winter path of Comet Garradd

| Star | Common Designations | Vis. Mag | Classification | Stellar Attributes | R.A. (2000) | Dec (2000) | Distance (lys) |
|---------|-------------------------------|-----------|----------------|---------------------------------|---------------|------------|----------------|
| 109 Her | HR 6895, HD 169414 | 3.84 | K2.5 III | Binary/ Suspected Variable | 18h 23m 42.1s | +21°46'08" | 130 |
| 102 Her | HR 6787, HD 166182 | 4.35 | B2 IV | None | 18h 8m 45.5s | +20°48'52" | 1500 |
| 101 Her | HR 6794, HD 166230 | 5.10 | A6 III | None | 18h 8m 52.9s | +20°02'43" | 320 |
| 98 Her | HR 6765, HD 165625 | 4.96 | M3 IIIa | Suspected Variable | 18h 6m 1.9s | +22°13'08" | 620 |
| 96 Her | V820 Her, HR 6738, HD 164852 | 5.22 | B3 IV | Variable (Spectroscopic Binary) | 18h 2m 23.0s | +20°50'01" | 1000 |
| 95 Her | HR 6729, HD 164668 | 4.96/5.18 | A5 III/G8 III | Multiple Star System | 18h 1m 30.0s | +21°35'44" | 470 |
| 93 Her | HR 6713, HD 164349 | 4.67 | K0 III | None | 18h 0m 3.4s | +16°45'03" | 660 |
| 79 Her | HR 6571, HD 160181 | 5.76 | A2 Vn | Multiple Star System | 17h 37m 31.1s | +24°18'36" | 240 |
| HR 6885 | HD 169191, TYC 01572 - 2438 1 | 5.25 | K3III | None | 18h 22m 49.1s | +17°49'36" | 440 |
| HR 6627 | HD 161833, TYC 01556 - 1341 1 | 5.61/5.72 | F2 V/A1 V | Multiple Star System | 17h 47m 8.1s | +17°41'49" | 370 |
| HR 6541 | HD 159332, TYC 01546 - 0208 1 | 5.65 | F6V | Variable | 17h 33m 22.8s | +19°15'23" | 120 |
| HR 6502 | HD 158148, TYC 01545 - 2527 1 | 5.52 | B5 V | None | 17h 26m 49.1s | +20°04'52" | 470 |
| Maasym | λ Her, HR 6526, HD 158899 | 4.41 | K3.5 III | Suspected Variable | 17h 30m 44.3s | +26°06'39" | 370 |

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The Orbital elements of Comet Garradd

C/2009 P1 (Garradd)

Epoch 2011 Dec. 25.0 TT = JDT 2455920.5

T 2011 Dec. 23.6767 TT

MPC

| q | 1.550535 | (2000.0) | | P | Q |
|---|-------------|----------|----------|------------|------------|
| z | -0.000685 | Peri. | 90.7475 | -0.1666100 | -0.8269119 |
| | +/-0.000000 | Node | 325.9977 | -0.5871976 | +0.5207849 |
| e | 1.001062 | Incl. | 106.1775 | +0.7921112 | +0.2121317 |

From 2360 observations 2009 Aug. 13-2011 Aug. 26, mean residual 0".4.

q = Perihelion distance (minimal distance from the Sun in AUs)

z = Reciprocal semimajor axis (in 1/AU)

e = orbital eccentricity (range in values: 0 to 1) with 0 = perfectly circular orbit & 1 = straight path somewhat hyperbolic

Peri. = Argument of perihelion (J2000 Epoch) in degrees.

Node = Longitude of the ascending node (J2000 Epoch) in degrees

Incl. = Inclination (J2000 Epoch) in degrees

P and Q = are mathematical representations for the orbital elements Peri.,Node, and Incl. in an alternative form.

NOTE: What is important is that one does not need to understand the orbital elements! Simply input these values in a good quality astronomy/planetarium program and the orbit of the comet will be displayed by its predicted path and motion across a simulation of the night sky. This can be used in preparing for a particular time period selected for future night sky observations or astrophotography sessions!

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IAU MPC Ephemeris data for C/2009 P1 Garradd (August 2011):

| Date | CDT | R.A. (J2000) | Decl. | Delta | r | El. | Ph. | M1 | *M2 | Sky Motion | | Moon Phase | Moon Mag. |
|-------------|------------|---------------------|--------------|--------------|----------|------------|------------|-----------|------------|-------------------|-------|-------------------|------------------|
| | h m s | | | | | | | | | "/min | P.A. | (0.00 - 1.00) | (Visual) |
| 2011 10 01 | 190000 | 18 07 37.0 | +19 21 06 | 1.706 | 1.915 | 85.9 | 31.4 | 8.0 | - | 1.02 | 264.4 | 0.25 | -10.10 |
| 2011 10 02 | 190000 | 18 05 55.9 | +19 18 34 | 1.718 | 1.907 | 84.7 | 31.5 | 8.0 | - | 0.99 | 264.3 | 0.36 | -10.62 |
| 2011 10 03 | 190000 | 18 04 18.3 | +19 16 04 | 1.729 | 1.899 | 83.6 | 31.6 | 8.0 | - | 0.95 | 264.1 | 0.47 | -11.01 |
| 2011 10 04 | 190000 | 18 02 44.2 | +19 13 37 | 1.741 | 1.892 | 82.5 | 31.6 | 8.0 | - | 0.92 | 264.0 | 0.57 | -11.32 |
| 2011 10 05 | 190000 | 18 01 13.4 | +19 11 12 | 1.752 | 1.884 | 81.5 | 31.7 | 8.0 | - | 0.89 | 264.0 | 0.67 | -11.56 |
| 2011 10 06 | 190000 | 17 59 45.9 | +19 08 50 | 1.764 | 1.877 | 80.4 | 31.7 | 8.0 | - | 0.86 | 263.9 | 0.76 | -11.75 |
| 2011 10 07 | 190000 | 17 58 21.5 | +19 06 33 | 1.775 | 1.870 | 79.4 | 31.7 | 8.0 | - | 0.83 | 263.9 | 0.84 | -11.89 |
| 2011 10 08 | 190000 | 17 57 00.2 | +19 04 20 | 1.787 | 1.862 | 78.3 | 31.7 | 8.0 | - | 0.80 | 263.9 | 0.90 | -12.00 |
| 2011 10 09 | 190000 | 17 55 42.0 | +19 02 12 | 1.798 | 1.855 | 77.3 | 31.7 | 8.0 | - | 0.77 | 263.9 | 0.95 | -12.08 |
| 2011 10 10 | 190000 | 17 54 26.6 | +19 00 08 | 1.809 | 1.848 | 76.3 | 31.7 | 8.0 | - | 0.74 | 263.9 | 0.98 | -12.13 |
| 2011 10 11 | 190000 | 17 53 14.1 | +18 58 10 | 1.821 | 1.841 | 75.3 | 31.6 | 8.0 | - | 0.71 | 264.0 | 1.00 | -12.14 |
| 2011 10 12 | 190000 | 17 52 04.4 | +18 56 18 | 1.832 | 1.833 | 74.3 | 31.6 | 7.9 | - | 0.69 | 264.1 | 1.00 | -12.12 |
| 2011 10 13 | 190000 | 17 50 57.3 | +18 54 32 | 1.843 | 1.826 | 73.3 | 31.6 | 7.9 | - | 0.66 | 264.2 | 0.97 | -12.07 |
| 2011 10 14 | 190000 | 17 49 52.9 | +18 52 53 | 1.853 | 1.820 | 72.4 | 31.5 | 7.9 | - | 0.64 | 264.4 | 0.94 | -11.99 |
| 2011 10 15 | 190000 | 17 48 51.0 | +18 51 20 | 1.864 | 1.813 | 71.4 | 31.4 | 7.9 | - | 0.61 | 264.6 | 0.88 | -11.88 |
| 2011 10 16 | 190000 | 17 47 51.5 | +18 49 54 | 1.875 | 1.806 | 70.5 | 31.4 | 7.9 | - | 0.59 | 264.9 | 0.81 | -11.73 |
| 2011 10 17 | 190000 | 17 46 54.4 | +18 48 36 | 1.885 | 1.799 | 69.6 | 31.3 | 7.9 | - | 0.56 | 265.2 | 0.73 | -11.55 |
| 2011 10 18 | 190000 | 17 45 59.7 | +18 47 25 | 1.895 | 1.792 | 68.7 | 31.2 | 7.9 | - | 0.54 | 265.5 | 0.64 | -11.33 |
| 2011 10 19 | 190000 | 17 45 07.2 | +18 46 21 | 1.905 | 1.786 | 67.8 | 31.1 | 7.9 | - | 0.52 | 265.9 | 0.54 | -11.05 |
| 2011 10 20 | 190000 | 17 44 16.9 | +18 45 26 | 1.915 | 1.779 | 66.9 | 31.0 | 7.9 | - | 0.50 | 266.4 | 0.43 | -10.70 |
| 2011 10 21 | 190000 | 17 43 28.8 | +18 44 39 | 1.925 | 1.773 | 66.1 | 30.9 | 7.9 | - | 0.48 | 266.9 | 0.33 | -10.25 |
| 2011 10 22 | 190000 | 17 42 42.7 | +18 44 00 | 1.934 | 1.766 | 65.2 | 30.8 | 7.9 | - | 0.46 | 267.5 | 0.22 | -9.64 |
| 2011 10 23 | 190000 | 17 41 58.6 | +18 43 30 | 1.944 | 1.760 | 64.4 | 30.7 | 7.9 | - | 0.44 | 268.2 | 0.13 | -8.80 |
| 2011 10 24 | 190000 | 17 41 16.5 | +18 43 08 | 1.953 | 1.753 | 63.6 | 30.5 | 7.9 | - | 0.42 | 268.9 | 0.06 | -7.53 |
| 2011 10 25 | 190000 | 17 40 36.2 | +18 42 56 | 1.962 | 1.747 | 62.8 | 30.4 | 7.9 | - | 0.40 | 269.8 | 0.02 | -5.27 |
| 2011 10 26 | 190000 | 17 39 57.8 | +18 42 53 | 1.971 | 1.741 | 62.0 | 30.3 | 7.9 | - | 0.38 | 270.7 | 0.00 | -1.64 |
| 2011 10 27 | 190000 | 17 39 21.1 | +18 43 00 | 1.979 | 1.735 | 61.2 | 30.1 | 7.9 | - | 0.37 | 271.8 | 0.01 | -5.87 |
| 2011 10 28 | 190000 | 17 38 46.2 | +18 43 16 | 1.988 | 1.729 | 60.4 | 30.0 | 7.9 | - | 0.35 | 272.9 | 0.06 | -7.84 |
| 2011 10 29 | 190000 | 17 38 12.9 | +18 43 42 | 1.996 | 1.723 | 59.7 | 29.8 | 7.9 | - | 0.33 | 274.2 | 0.12 | -9.00 |
| 2011 10 30 | 190000 | 17 37 41.1 | +18 44 18 | 2.004 | 1.717 | 59.0 | 29.7 | 7.9 | - | 0.32 | 275.7 | 0.21 | -9.78 |
| 2011 10 31 | 190000 | 17 37 11.0 | +18 45 04 | 2.011 | 1.712 | 58.2 | 29.6 | 7.9 | - | 0.31 | 277.3 | 0.31 | -10.36 |

All ephemeris data is calculated based on the Geographical location of the George Observatory, SE Texas, United States.

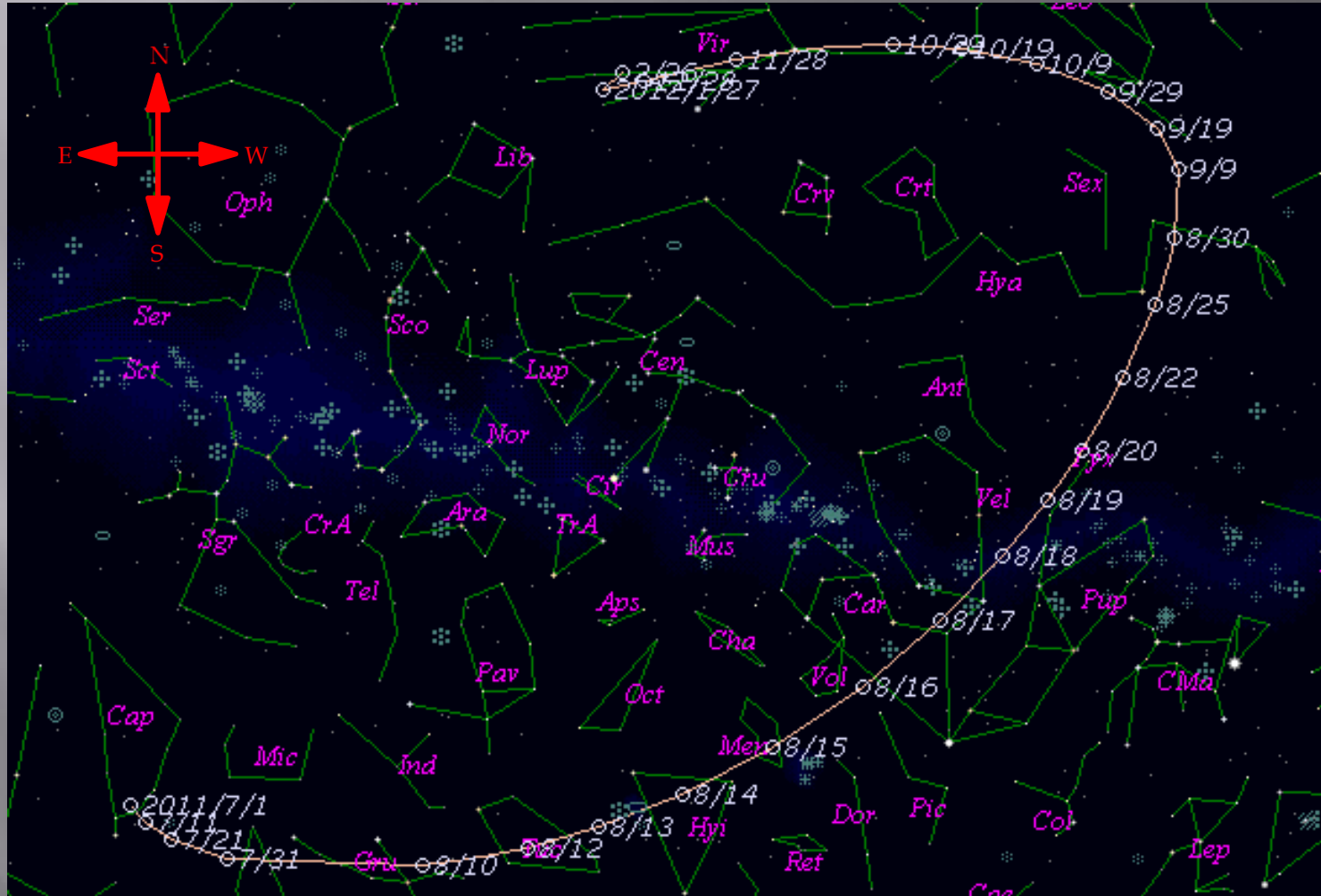
*M2 values are not shown if values are fainter than 19th magnitude!

29°22'30" N, 95°35'37" W

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45P/Honda - Mrkos - Pajdusakova

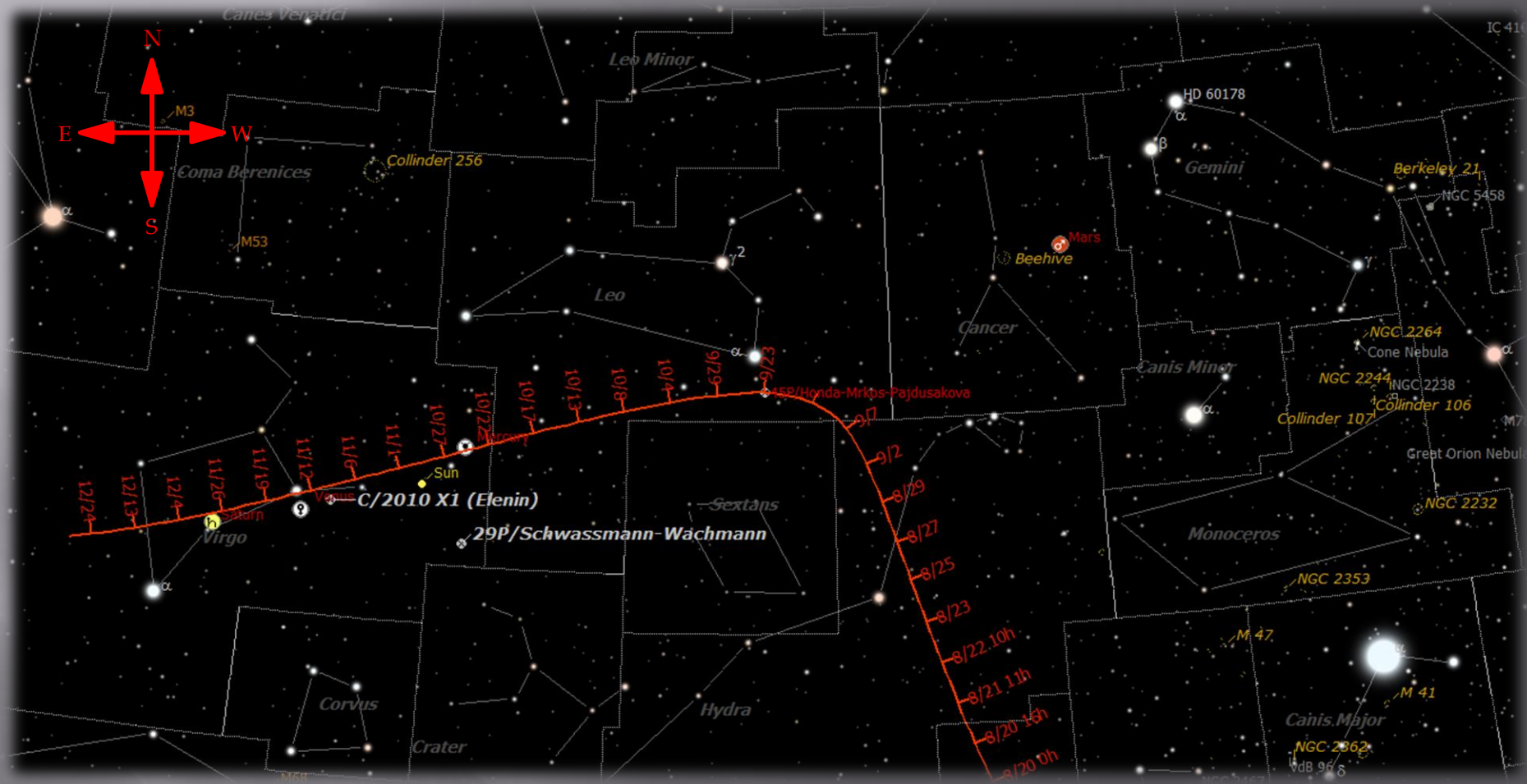
Figure 3: The projected path and wide retrograde action of Comet 45P for 2011!



Courtesy of www.aerith.net: Seiichi Yoshida's Comet Page!

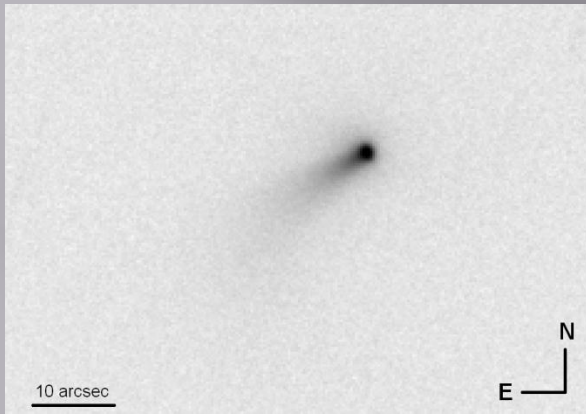
45P/Honda - Mrkos - Pajdusakova

Figure 4: A Up-close projected path for Comet 45P across the Late Winter/Early Spring Sky!



Courtesy of SkyTools 3 Profession Ed, 2011.

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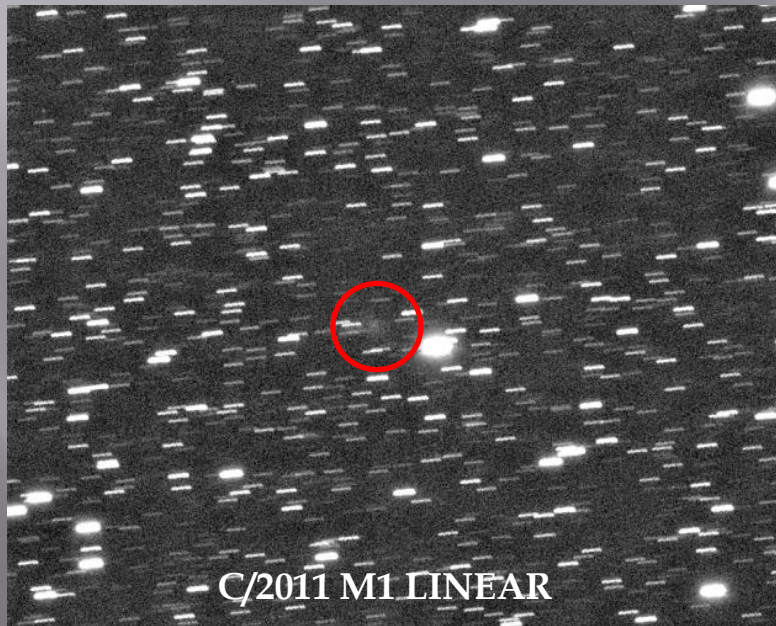
45P/Honda-Mrkos-Pajdusakova



C/2010 G2 Hill



78P/Gehrels 2



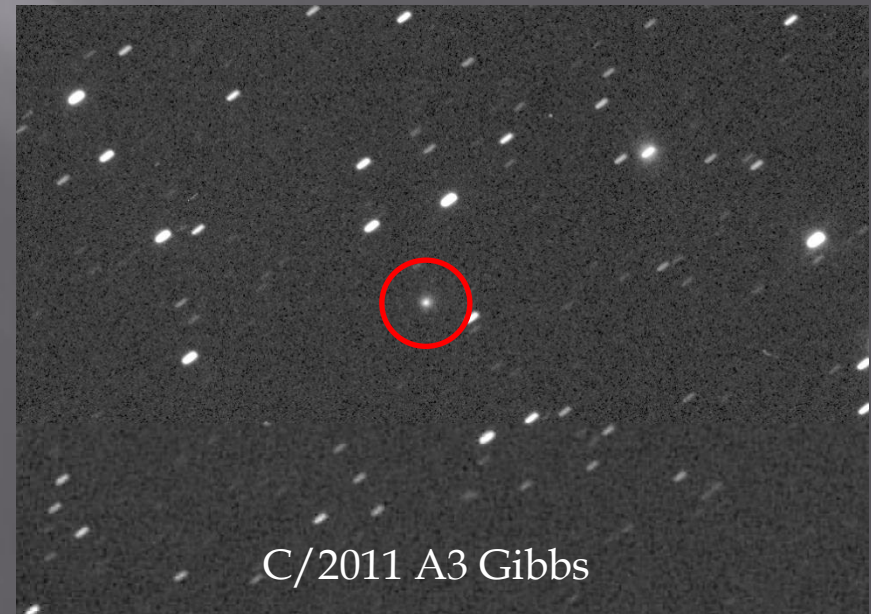
C/2011 M1 LINEAR



213P/Van Ness



Not observable again until the morning skies of
this coming November!



Late Summer/Early Autumn – September 2011