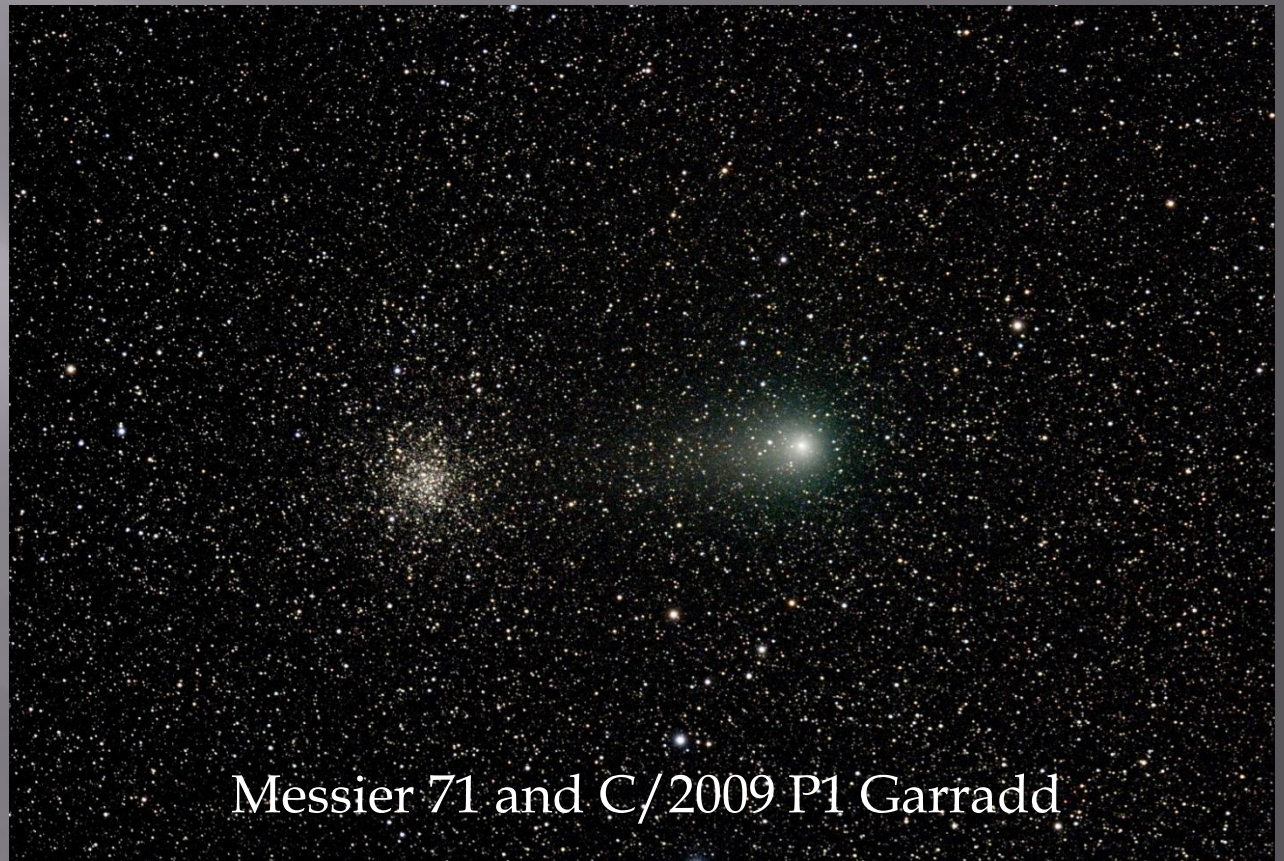


The Professor Comet's Report ¹



Messier 71 and C/2009 P1 Garradd

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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!

Late Summer/Early Autumn – September 2011

The Professor Comet's Report ²

The Current Status of the Predominant Comets for July 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 - 7.2	Getting Brighter	60°N - 60°S	Between Sagitta and Vulpecula (heading WNW towards Hercules)	All Night
Honda - Mrkos - Pajdusakova	45P	P	8.0	Getting Brighter	50°N - 85°S	<i>Undergoing a wide retrograde motion! Currently the comet is north of Hydra heading NE towards Leo</i>	Early Morning
Elenin	2010 X1	C	8.6 - 9.4	Getting Brighter	45°N - 75°S	Currently undergoing retrograde motion in the S region of Leo	Early Evening (Just after Dusk)
Crommelin	27P	P	9.5	Possibly Fading?	N/A	Poor Elongation <i>(lost in the daytime glare!)</i>	N/A
LINEAR	2011 M1	C	10.4	Brightening	60°N - 45°N	Moving SE of Ursa Major and heading across the E edge of Leo Minor	All Night
Hill	2010 G2	C	11.1	Fading	60°N - 10°N	Between Ursa Major and Lynx (Moving SSW of Muscida)	All Night
Gibbs	2011 A3	C	11.4	Brightening	55°N - 55°S	Moving East from Virgo to Serpens Cauda/Ophiuchus	Early Evening
Van Ness	213P/2009 B3	P	12	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
Schwassmann - Wachmann 1	29P	P	12.5	Fading with variation	N/A	Poor Elongation (Possibly between Sextans and Crater)	N/A

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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>

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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.

DC value	Definition to numerical DC designation
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 Summer 2011!

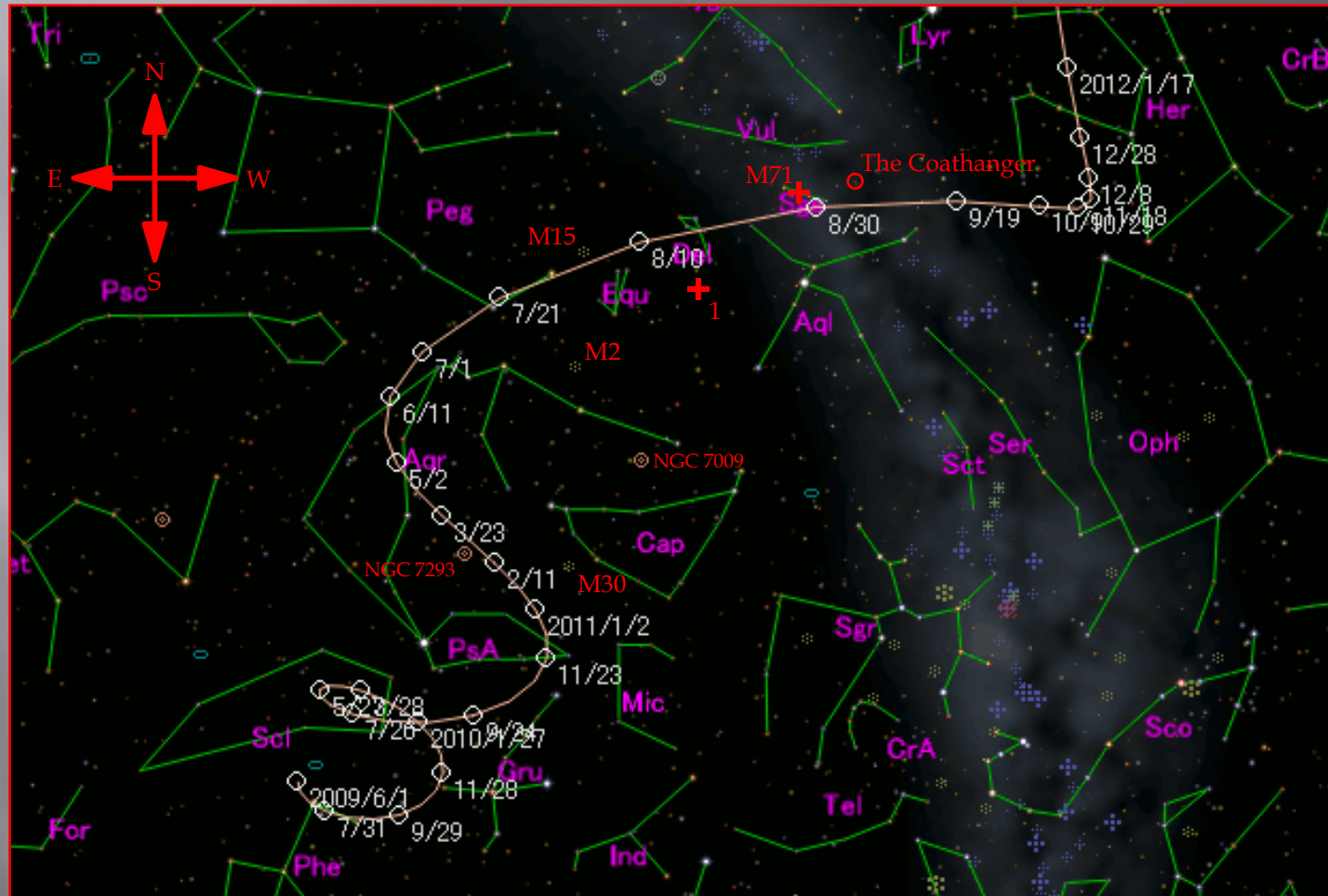
As the Autumn season for 2011 starts to come upon us comet C/2009 P1 Garradd is already showing more promise as a bright comet for these remaining months of this year and well into the winter months of 2012! Recent field reports on the observation of the comet are giving us a range of visual magnitudes between 7.0 – 7.2; the odds of it reaching 6th magnitude before the end of September are improving rapidly. The minor planet center in their ephemeris data had predicted that the comet would not reach 7th magnitude in visual brightness until mid February 2012 and already that prediction has been busted by 5 ½ months! The tail of the comet which forms as an original fan - like tail has formed into a proper dust - like track that now stretches by over 1° while the coma has reached a maximum size of 12 arcminutes and reports average it between 6 – 10 arcminutes based on a variety of field observations. The coma is also showing itself to be elliptical shape similar to an E3 classification which is consistent with the more pronounced tail observable using any pair of at least 10x50 binoculars; the P.A. of Garradd's tail appears to be close to 230° as it moves westward across width the Milky Way. Comet Garradd continuing on its path across the Summer constellations and currently resides in the southern region of the great stellar asterism 'The Summer Triangle'. During the early part of September Garradd will be moving across the southwestern edge of the constellation of vulpecula and just south of another stellar asterism; the Coathanger cluster during the evenings of 2 – 4 September. It is continuing to march across the night sky marching to the WNW in the direction of the constellation of Hercules at a rate of about 0.8°/day and will eventually show down to half that speed by month's end! A partial retrograde motion is still predicted for comet Garradd during the month of November with a swing northwards while being east of the Keystone! Assuming that Garradd based on several brightness predictions will reach at maximum brightness of 6.0 – 6.5 during the period of 11 – 24 February 2012; it makes it prime for naked eye observing especially under dark skies of the late winter nights as it passes through the head of Draco. However, any comets similar to Garradd are known for their potential to behave unpredictably with unexpected outbursts in brightness and possible fragmentation; a possibly for such cometary nuclei being only a few to several kilometers in size along with surpassing expectations for the year! Right now with an angular size for Garrad's coma averaging between 6 – 10 arcminutes the comet is easily observable in small binoculars and telescopes at very low power and a wide field of view (at least 60° FOV); at a average, maximum coma size of 10' it is ~1/10 the size of an average full Moon!

A Synopsis of the Predominant Comets for Summer 2011!

Generally when a comet gets brighter it usually gets bigger in terms of its angular size which can be theorized based on its orbital elements, proximity to the Earth and Sun, and predictions based on photometry analysis (rate at which it increases in brightness). Garradd will reach perigee during the period of 23 – 24 Dec 2011 at a minimum delta of 1.5505 AU or 144 million miles (231.8 million km) from the Earth. It is expected to reach perihelion on 5 March 2011 at 1.2569 AU or 116.2 million miles (187 million km) from the Sun. During the time between perigee and perihelion the comet will be increasing in brightness as it moves away from the Earth during the mid-Winter and progress towards the Sun through Mid – March 2012! Garradd is destined to fly across the southern region of the Brocchi's cluster (The Coathanger Cluster) and will get to within 0.87° or 52.2 arcminutes south of 4 Vulpeculae (the southern most star of Brocchi's cluster or the coathanger) or the top of the curl in the hook of the hanger during the night of 2 September 2011 at 23:27 CDT (see figure 3). 4 Vulpeculae is K0 III class star making it a bright, orange giant at 5.14 visual magnitude. During that same time the comet will appear to be in occultation with the star HD 182718 which is a A0 class (Whitish-Blue) star at 8.3 mag. Upon passing west of the coathanger region the night of 4 – 5 Sept, comet Garradd will have sailed pass the upper plane of the Milky Way and head into the rather unremarkable SE region of Hercules. There are an endless variety of Abell galaxy clusters, faint galaxies of 13th magnitude and fainter along with some rather undistinguishable stellar binaries, but this area of Hercules is rather desolate of bright distinguishable non – stellar DSOs! There is the tiny 5.2" diameter planetary nebula Vyssotsky 1 – 2 (PNG 053-24.1) which is a 12th magnitude non – stellar DSOs lying about halfway between the variable star Xi Herculis and the multiple star system Mu Herculis. However, it is well to the north of the comet's track and the other prominent candidate is the 12.2 visual magnitude elliptical galaxy NGC 6482 will be 4.14° to the north of the comet around 13 Oct!

C/2009 P1 Garradd

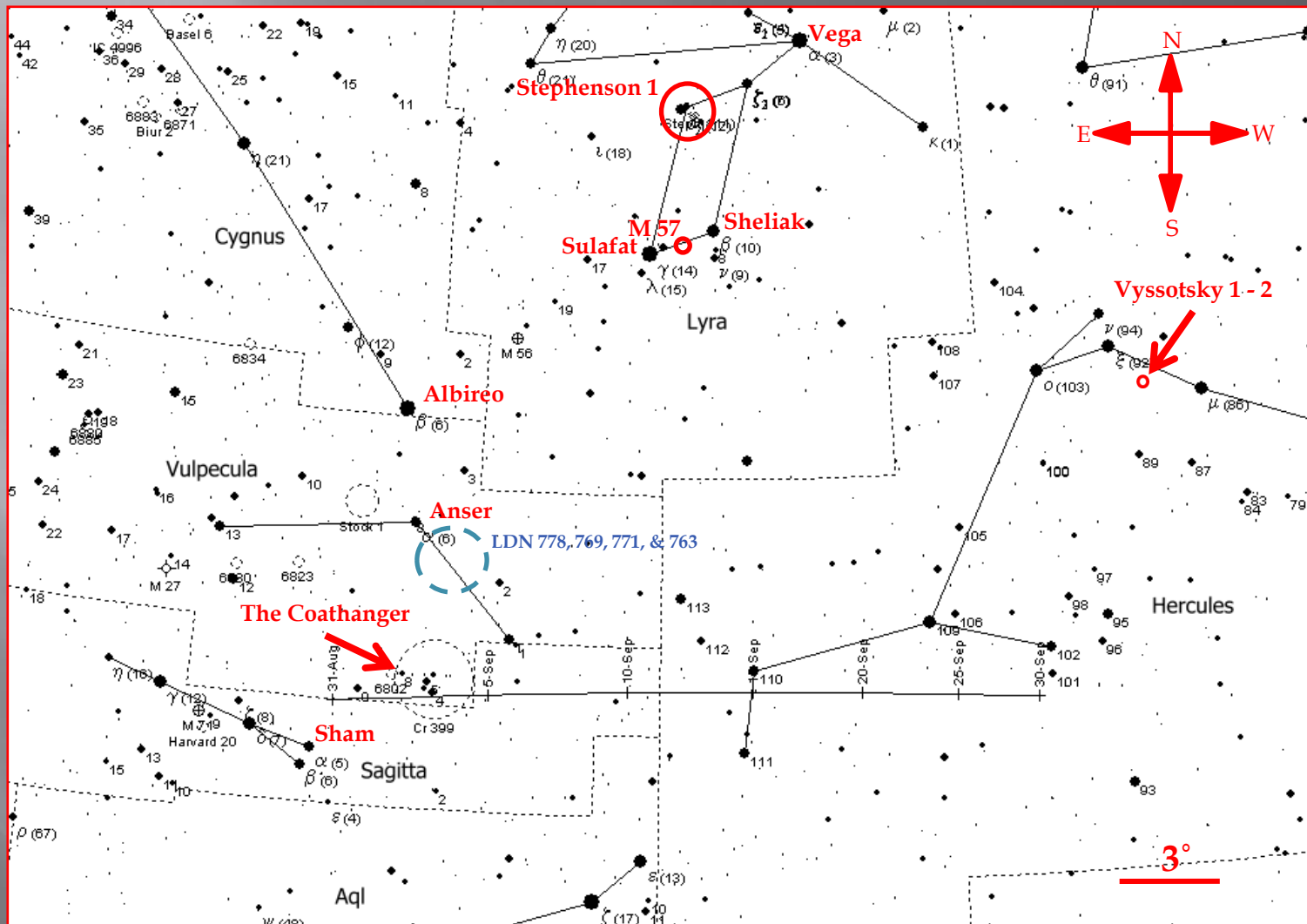
Figure 1: Garradd P1 projected path through the summer sky!



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

C/2009 P1 Garradd

Figure 2: Close up of Garradd P1 projected path from 31 Aug - 30 Sept 2011!

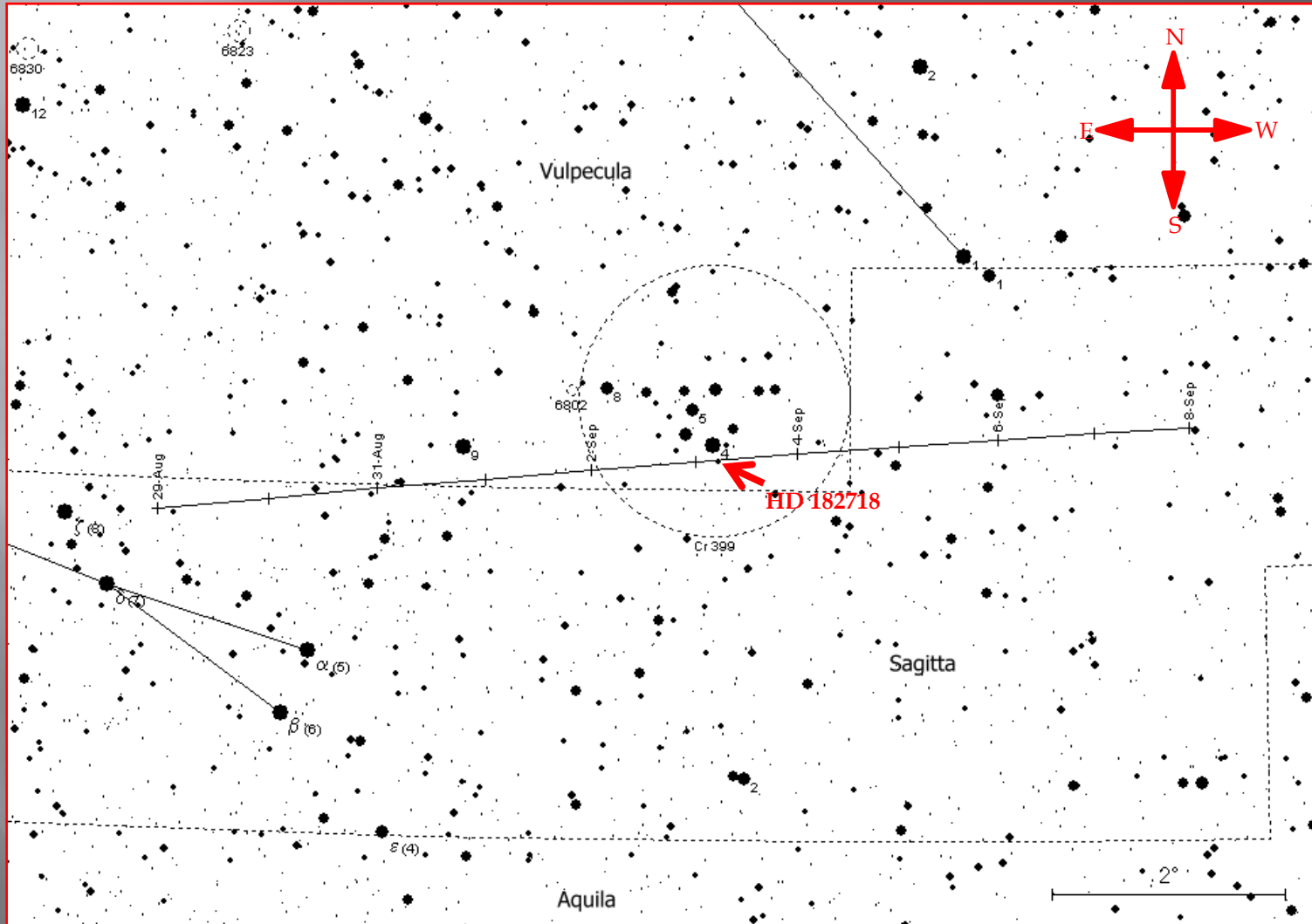


Courtesy of Winnie's Comet Pages 2011

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C/2009 P1 Garradd

Figure 3: Path of Comet Garradd P1 across the Coathanger Cluster (2 - 5 Sept 2011)!



Courtesy of Winnie's Comet Pages 2011

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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	
	h m s									"/min	P.A.
2011 09 01	190000	19 30 41.5	+19 33 49	1.417	2.164	125.4	22.4	8.1	-	2.26	275.2
2011 09 02	190000	19 26 53.1	+19 38 17	1.422	2.155	123.9	22.9	8.1	-	2.22	274.7
2011 09 03	190000	19 23 08.4	+19 42 12	1.428	2.146	122.5	23.4	8.1	-	2.18	274.2
2011 09 04	190000	19 19 27.5	+19 45 35	1.435	2.137	121.1	23.8	8.1	-	2.14	273.7
2011 09 05	190000	19 15 50.5	+19 48 29	1.441	2.129	119.6	24.3	8.1	-	2.10	273.2
2011 09 06	190000	19 12 17.6	+19 50 53	1.448	2.120	118.2	24.8	8.1	-	2.06	272.7
2011 09 07	190000	19 08 49.0	+19 52 51	1.456	2.111	116.8	25.2	8.1	-	2.02	272.3
2011 09 08	190000	19 05 24.7	+19 54 22	1.464	2.103	115.4	25.7	8.1	-	1.97	271.8
2011 09 09	190000	19 02 04.8	+19 55 29	1.472	2.094	114.0	26.1	8.0	-	1.93	271.4
2011 09 10	190000	18 58 49.3	+19 56 13	1.480	2.085	112.5	26.5	8.0	-	1.89	270.9
2011 09 11	190000	18 55 38.4	+19 56 35	1.489	2.077	111.2	26.9	8.0	-	1.84	270.5
2011 09 12	190000	18 52 32.1	+19 56 37	1.498	2.068	109.8	27.2	8.0	-	1.80	270.1
2011 09 13	190000	18 49 30.3	+19 56 20	1.508	2.060	108.4	27.6	8.0	-	1.75	269.7
2011 09 14	190000	18 46 33.1	+19 55 45	1.518	2.052	107.0	28.0	8.0	-	1.71	269.3
2011 09 15	190000	18 43 40.6	+19 54 55	1.527	2.043	105.7	28.3	8.0	-	1.67	268.9
2011 09 16	190000	18 40 52.6	+19 53 50	1.538	2.035	104.3	28.6	8.0	-	1.62	268.5
2011 09 17	190000	18 38 09.2	+19 52 31	1.548	2.027	103.0	28.9	8.0	-	1.58	268.1
2011 09 18	190000	18 35 30.4	+19 51 00	1.558	2.018	101.7	29.2	8.0	-	1.53	267.8
2011 09 19	190000	18 32 56.1	+19 49 18	1.569	2.010	100.4	29.4	8.0	-	1.49	267.4
2011 09 20	190000	18 30 26.3	+19 47 26	1.580	2.002	99.1	29.7	8.0	-	1.45	267.1
2011 09 21	190000	18 28 00.9	+19 45 25	1.591	1.994	97.8	29.9	8.0	-	1.41	266.8
2011 09 22	190000	18 25 39.9	+19 43 17	1.602	1.986	96.6	30.1	8.0	-	1.37	266.5
2011 09 23	190000	18 23 23.2	+19 41 03	1.613	1.978	95.3	30.3	8.0	-	1.32	266.2
2011 09 24	190000	18 21 10.8	+19 38 42	1.625	1.970	94.1	30.5	8.0	-	1.28	265.9
2011 09 25	190000	18 19 02.6	+19 36 18	1.636	1.962	92.9	30.7	8.0	-	1.24	265.6
2011 09 26	190000	18 16 58.5	+19 33 50	1.648	1.954	91.7	30.9	8.0	-	1.21	265.4
2011 09 27	190000	18 14 58.4	+19 31 19	1.659	1.946	90.5	31.0	8.0	-	1.17	265.1
2011 09 28	190000	18 13 02.3	+19 28 46	1.671	1.938	89.3	31.1	8.0	-	1.13	264.9
2011 09 29	190000	18 11 10.1	+19 26 13	1.683	1.930	88.1	31.2	8.0	-	1.09	264.7
2011 09 30	190000	18 09 21.7	+19 23 39	1.694	1.922	87.0	31.3	8.0	-	1.06	264.6
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

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

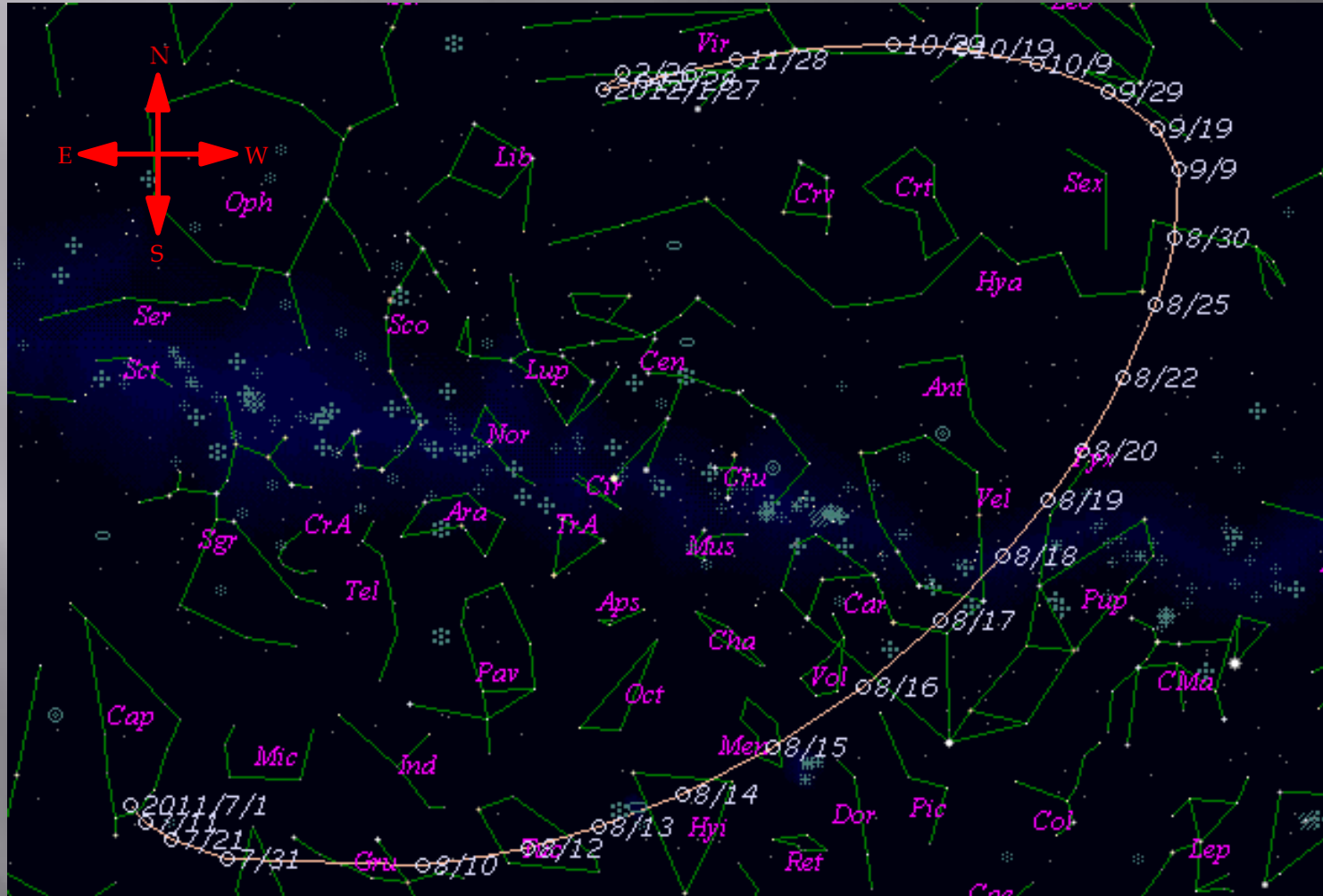
*M2 values are not shown if values are fainter than 19th magnitude!

29°22'30" N, 95°35'37" W

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45P/Honda - Mrkos - Pajdusakova

Figure 4: The projected path and wide retrograde action of Comet 45P for 2011!

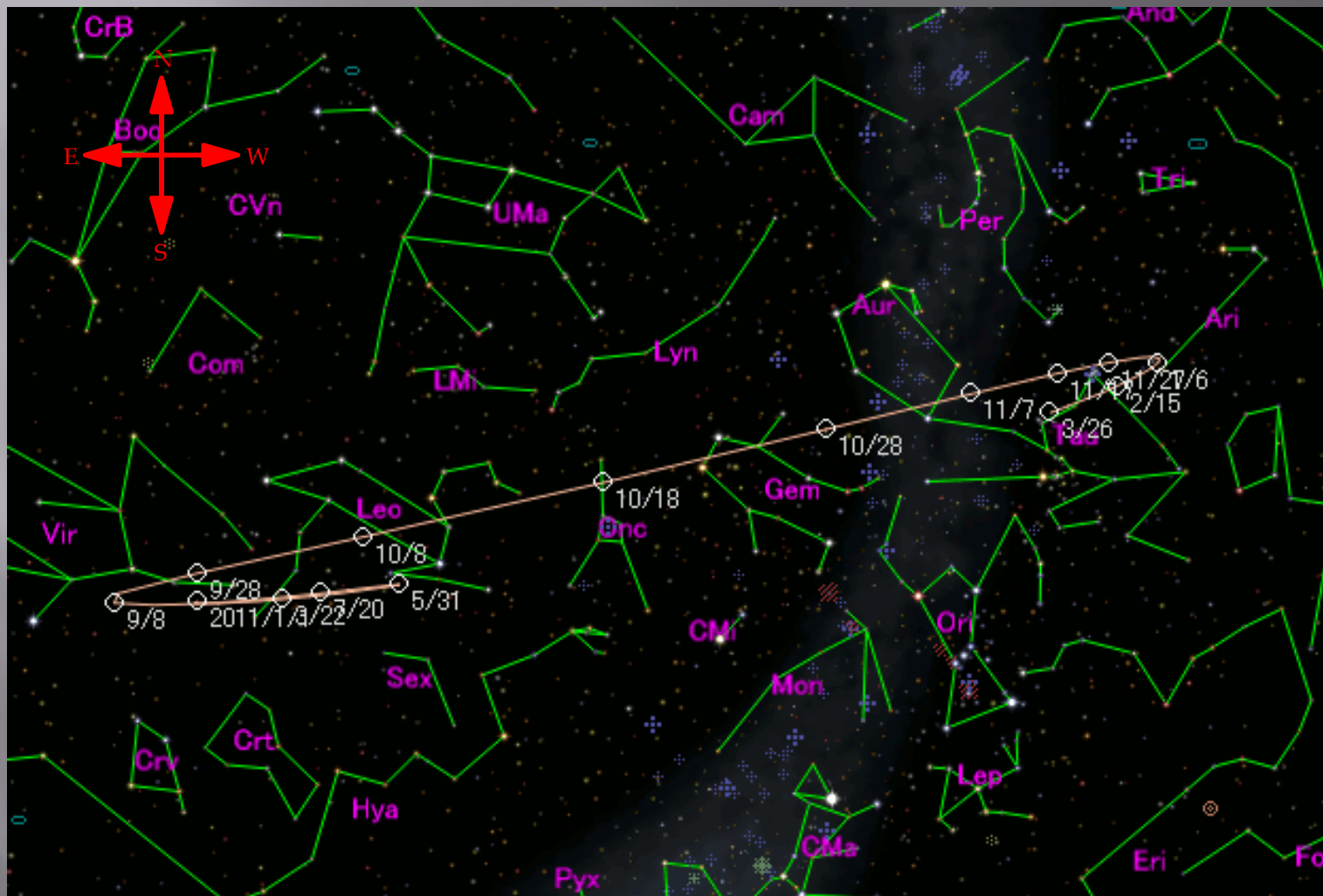


Courtesy of www.aerith.net: Seiichi Yoshida's Comet Page!

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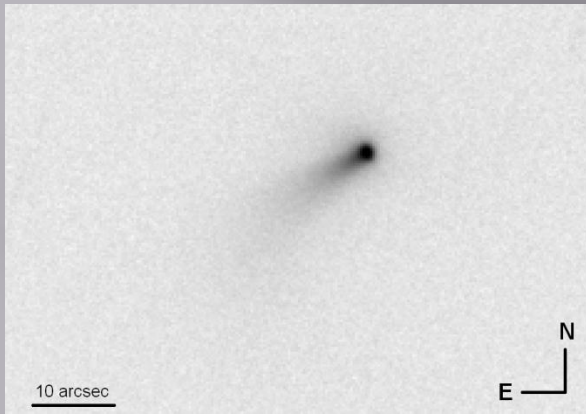
C/2010 X1 Elenin

Figure 5: The projected path of Elenin from 2011 thru the 2012 Winter!

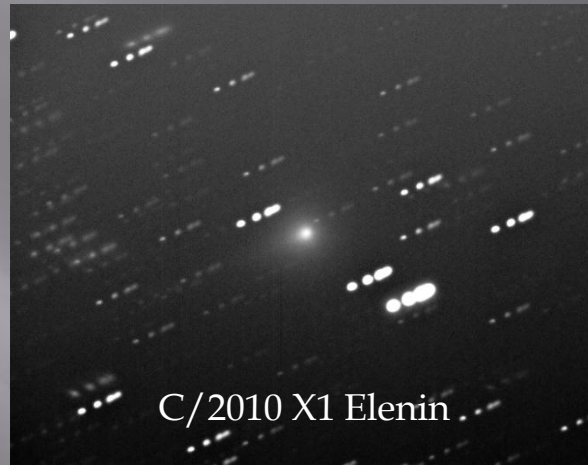


Courtesy of www.aerith.net: Seiichi Yoshida's Comet Page!

Late Summer/Early Autumn – September 2011



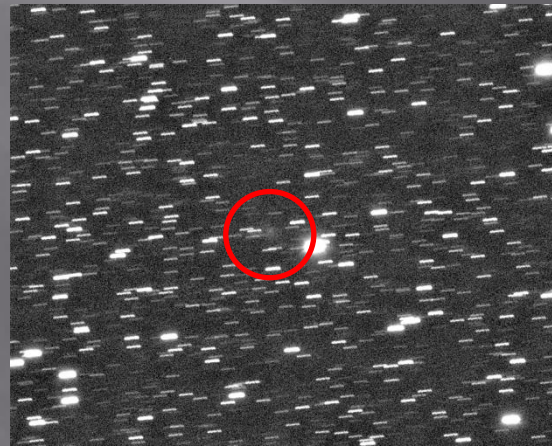
45P/Honda-Mrkos-Pajdusakova



C/2010 X1 Elenin



27P/Crommelin



C/2011 M1 LINEAR

