

A naked-eye comet invites itself to the March sky, 2013

March 8 2013



It will appear in the West at sunset, from around the 8th to the 13th of March 2013, and will be visible to the naked eye up to the end of the month. Comet Pan-Starrs C/2011 L4 will traverse Cetus, Pisces, Pegasus and Andromeda. The scientists of the Paris Observatory are calculating its path. They have been following it since September 2012, using the large Nançay radiotelescope (in the Cher region of France), the Herschel infra-red space observatory, at the Pic-du-Midi Observatory (in the Pyrenees), and with the antennas at Bure (in the Alps), at Pico Veleta (Spain), and at Chajnantor (Chile).

To observe

At present in the [Southern hemisphere](#), this winter's-end guest will, on Friday the 8th of March 2013, make its appearance 5° above the western horizon at sunset. It will then be 18h44, Paris time. The last glimmer of civil twilight will last till 19h16, and the [celestial object](#) will in its turn hide itself below the horizon nine minutes later. To enjoy the sight, [amateur astronomers](#) will have to summon their patience and wait till March 13th. According to estimates, the comet will be as bright as the neighboring stars in the square of Pegasus.

Specialists from the [Paris Observatory](#) are advising members of the general public to find an appropriate place from which to see the comet: it should be dark, without surrounding illumination and cloudless, far from towns, if possible in the countryside with a clear view to the West. The diffuse tail of the comet, made of gas and dust, will grow from day to day. To see it well, binoculars or a telescope will be of help. Wandering across the [celestial sphere](#), the vagrant will pass close to Mars, Uranus, the thin crescent Moon and the [Andromeda galaxy](#).

The comet

Pan-Starrs was discovered on June 8th 2011 with the 1.8m telescope of the Panoramic Survey Telescope And Rapid Response System (Pan-Starrs) at Haleakala, Maui, Hawaiï. This is a new comet, never seen before, and which will make just one unique visit in our sky before being ejected into the depths of the Galaxy.



Path of comet Pan-Starrs C/2011 L4 in March 2013. Credit: Observatoire de Paris / IMCCE / P. Rocher

Comets consist of a nucleus of ice and dust, dating from the very origin of the solar system. As they approach the Sun, they heat up. The ice evaporates. An extensive envelope, the atmosphere or coma, develops around the bright nucleus. It is drawn out into two enormous tails of gas (ionized molecules) and dust which can extend over millions of kilometers.

In contrast to their historic predecessors, modern comets are no longer seen as omens or sacred symbols. Halley's famous comet is on an orbit such that it returns to the inner part of the solar system every 76 years: 1910, 1986, 2061...

Official calculations

The calculation of the orbit made by Patrick Rocher, astronomer at Institut de Mécanique Céleste de Calcul des Éphémérides IMCCE (Institute of Celestial Mechanics and Ephemeris Calculations) of the Observatoire de Paris, is based on the data from 1385 worldwide observations made from the 21st of May 2011 to the 9th of February 2013. The attractions of all the planets and the Sun have been taken into account, as well as the effects of Einstein's general relativity. The

residual uncertainty in the position of the celestial body is estimated to be 0,34 seconds of arc: 1/6000th of the apparent diameter of the full Moon in the sky. All in all, C/2011 will pass the Earth at a distance of 164 million kilometers on Tuesday, the 5th of March at 7 minutes and 33 seconds past 11, and will pass the Sun at a distance of 45 million kilometers on Sunday the 10th of March at 3 minutes and 12 seconds past 5. The estimates of its brightness are based on 300 to 700 observations.

Science on the move

François Colas, CNRS research fellow at the l'IMCCE of the Observatoire de Paris, will be working from the 11th to the 17th of March with the 1m telescope at the Pic-du-Midi observatory in the Pyrenees.

For its part, the team led by Dominique Bockelée-Morvan, CNRS research director, at Laboratoire d'Études Spatiales et d'Instrumentation en Astrophysique LESIA of the Observatoire de Paris had already detected the comet in September 2012 using ESA's European Herschel infra-red telescope. Furthermore, Jacques Crovisier and Pierre Colom, deputy astronomers, started tracking Pan-Starrs C/2011 L4 at about the same time using the 300 m wide Nançay [radiotelescope](#) (Cher, région Centre, in the neighbourhood of Orléans, France) – this latter is a scientific unit of the Observatoire de Paris. They are interested in the OH radical, produced by the photodissociation of the water coming from the ice, and will thereby try to anticipate how the cometary activity will evolve over time.

15 tons of water...

The first result: the combined Herschel/Nançay results indicate that

Over 5.5 months, from the beginning of September to the end of February, the comet had increased by a factor of 100 its water vapour H₂O production rate. It has risen from 140 kg/second to about 15 tonnes/second. And this is still liable to change for a certain time.

The group is now preparing a collaborative effort, using the new giant international array – the Atacama Large Millimeter Array ALMA, consisting of 56 antennas installed at an altitude of 5 000 meters on the Chajnantor plateau, in the Andes Cordillera in Chile. At the same time, Nicolas Biver, CNRS research fellow, will be working with the 30 m antenna of the Institut de radio astronomie millimétrique IRAM, on the Pico Veleta, Andalusia, in Spain. Finally, a colleague from the astrophysical laboratory of the Aix-Marseille University will complement the observations at these wavelengths using the six 15m antennas on the Plateau de Bure, in the French Alps.

All in all, seven scientists from two departments of the Observatoire de Paris will participate in the international campaign centred on the [comet](#).

Provided by L'Observatoire de Paris

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