

CETCH A COMET
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1. History

In the whole history of different cultures and societies around the world comets have caused fear and horror. Called with horrid names - “portents of death” and “threat to the Universe” for the people comets have been messengers from gods or bad omens. Why have people feared so much from them? Because they are different from the other space objects at the celestial sphere. Because they appear unpredictably, move on and disappear during the day and the night.

In Ancient times people perceived comets as a flaming fire sword, symbol of war and death. Ancient Greeks saw them as a woman`s head with long hair - symbol of mourning. That is where their name comes from - " κομήτης " - a star with a tail, a comet, “hairy”; literally - long-haired.



Woodcut shows destructive influence of a fourth century comet (Amsterdam 1668)

Legends and myths incited fear and horror from the hairy stars. The most ancient known mythology - the Babylonian “Epic of Gilgamesh”, describes fire, brimstone and floods, connected with an arrival of a comet. **Aristotle** binds the big comet from 373-372 B.C. with the earthquake in **Achaea**.



Adoration of the Magi, Arena Chapel (ca. 1305)– Giotto. The great Italian artist paints this painting two years after the passing of the Haley comet in 1302.

In St. Matthew`s Gospel is being told about the **Bethlehem star**, anterior Christ`s birth and guide for the three sages. It was an unordinary star, as it was moving from north to south and appeared during the day. Because of its unusual behaviour , this star could be a comet.

The devastating for the Byzantium sudden attacks of the Huns are “caused” from the near drawn in 451 Halley's comet. The first appearance of the proto-Bulgarians in the Byzantine Empire in 539 AD was also accompanied by a comet. Procopius of Caesarea - Byzantine writer, associates its appearance with horrifying proto-Bulgarian advance and leading into captivity 120 000 people.



The advance of the proto-Bulgarians into Byzantine lands,

marked by the Halley's comet, turns into fight for creating and establishing an individual country. The great Bulgarian ruler khan Krum fights with emperor Michael I Rangabe in front of Adrianople in 813. During that time byzantine chroniclers mention for the appearance of two comets before the battle: "When the two armies- Bulgarian and Greek's - approached there was a terrible omen in the sky: two comets appeared as moons, gathering and separating... in summer 813..."

Later Paisius of Hilendar, a Bulgarian monk, describes the same event in the first Bulgarian history. Is not it an evidence for separation of a comet's core?

At the end of ninth -the begging of the tenth century, at the territory of Byzantine the proto-Bulgarians have already built prosperous kingdom, crafts have been evolving as well as the construction and culture. In the capital- **Veliki Preslav** Bulgarian monks create letters. In "Hexameron" and "**Heaven**" of John Exarch and other written sources, is described the passing of at least ten other comets.

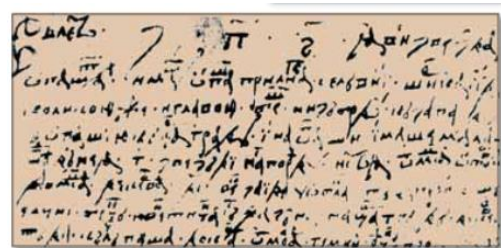


In the middle ages the appearing of the comets was connected with the expand of the Byzantine empire. The beliefs that the Halley's comets brings destruction, wars and religious conflicts, become more convincing after the conquest of Constantinople (1453) and the movement of the Ottomans to Belgrade (1456).

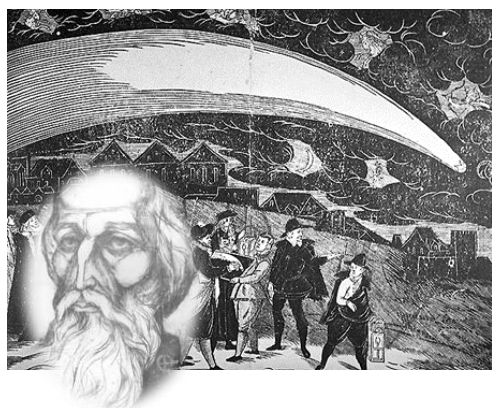
Bulgaria is enslaved by the Turks, but the bulgarians continue to record earthly and celestial events. An observation of a big comet from 1577 was described by unknown man from Gabrovo (C/1577 V1).(2).Unnamed chronicler who has seen the comet marks that her tail resembles a rope. Therefore the chronicler has seen the comet before T. Brahe. The comparison of the comet's tail with a rope is a proof, because in its preserved drawings the comet is wider at its end than at its head. That shows that it has been observed in different time. In modern Bulgarian language the note for this event says:

"In summer 7086(1577) a tail of a star appeared. And it was moving like a rope. And with its head pointing to the west, and with its tail pointing to Istanbul. And on the tail there was a small star, in front of her there were three more stars. And it shined since 8 October to the evening of 14 December and disappeared in the clouds."

Also in 1666 from the Bulgarian land , appearance of a comet is being watched and described. Its interesting that this celestial visitor is watched in **Ceylon** and Korea, without any other information for observations from



Приписките на неизвестния българин в ръкопис № 415 от сбирката на Виктор Григорович в Държавната научна библиотека „А. М. Горки“ – Одеса. Факсимиле от оригинала.



Europe!

In 1682 the Halley's comet was called to be a carrier of disaster again. Pope Innocent XI has cursed it and ordered to ring all bells, to send it out. But this time the comet is a curse for the turk conquerors- they saw an omen in the sky, a Christian cross and a reason for their failure in invading in Western Europe.

In Rila monastery the predecessor of Paisius, **Iosif Bradati** (1682/83-1757), writes about the comet in Bulgarian homilies from 1743. Halley observes this appearance exactly and calculates the elements of its orbit.



In the same distant 1743 two bright comets have appeared: C/1743 C1, the **Grishow comet**, which on 08.02.1743 has passed only 6 million kilometers from Earth and it's been so bright that it's been visible during the day, and another one, in December, C/1743 X1. In the begging of 1744 this comet develops a tail 1.5-2° (3-4 Moon diameters). **Iosif Bradati** could be told for discoverer of this comet.

Six bright fan-shaped tails of the comet C/1743 X1 (De Cheseaux). The painting is created in the night of 8/9mart 1744.



The big comet 1843 with straight tail (C/1843 D1) probably has inspired a painter from Sliven, to limn in the plot of "Christmas" (today placed in The city art gallery "Dimitar Dobrovich"- Sliven) the **Bethlehem star** as...a comet with straight tail !



Not only in the distant past the fear of a comet appearing has eroded the people. In 1910 at the appearing of the Halley's comet in Bulgaria there was panic, although the astronomers tried to calm the people down. In the expectation of the end many people untied the knot, the beer in Sofia and Plovdiv had run out.

2.What are comets?

Comets are bodies from the solar system, which go around the Sun along flattened orbits. They look like a nebula with bright crowding in the middle and in the tail. Comets are icy bodies which release gas or dust and people compare comets to dirty snow balls. Those space vagabondages contain dust, ice, carbon dioxide, ammonia, methane etc. and that is why comets are considered by some researchers to be original sources of water, organic molecules and maybe life on the Earth.

3. Characteristics of comets:

3.1: Physics characteristics

Comets are constructed from:

-solid nucleus,



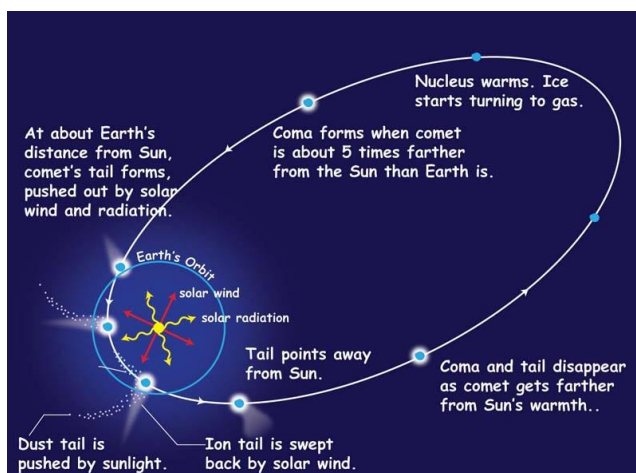
The comet Holmes (17P/Holmes) in 2007, with its blue ionic tail.

which consist mostly of ice and dust, covered with dark organic material. The ice is of water and frozen substances such as ammonia, carbon dioxide, carbon oxide and methane. The comet's nucleus can have a small rocky nucleus. It is supposed that comet's nucleus can not have larger size than 16 kilometers.

-The coma

is a cloud around the nucleus, which is formed when the comet gets near the Sun. Then the ice at the nucleus surface sublimates into gas and similar to atmosphere coma is formed. It can reach a size up to 1 600 000 kilometers.

- Tail:



Tails are the most remarkable detail of comets! Solar radiation pushes out dust particles away from the coma and they formed dust tail. Charged by the Sun particles ionize the comet's gases into ions and formed ionic tail.

Comets can not have sharp borders, they are transparent and through them stars are visible.

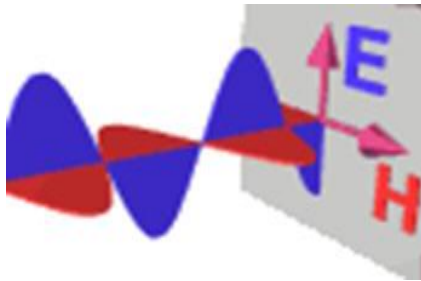
They are formed by strongly rarefied substance. Their composition is varied - gases or small motes, or mixture of both. During the study of the comet 81P/Wild by the spacecraft Stardus, became clear that composition of the motes is similar to material of asteroid from the Solar system. It is said, that tails are nothing visible, but they can be watched because of the illumination of the gas and dust. The illumination is connected with the ionization of the gas by the ultraviolet rays thrown out of the Sun surface. And dust just disperse the sunlight.

The tails are brightest, when comets are near perihelion of their orbit. Here, under the action of strong warmth of the Sun, the comet evaporated gas and dust. The length of the comet's tails reach scores and hundred million kilometers. Comets, which tails are extend to half the sky, are observed. The dust, steamed from the comets, gets into interplanetary space and coming into collision with enormous speed with the atmosphere of the Earth, formed meteor showers.

HYAKUTAKE is the comet with the longest tail. In May 1996, from its research by the spacecraft Ulysses, it was found that its ionic tail is long about a 360 million miles(around four times the distance Earth-Sun)

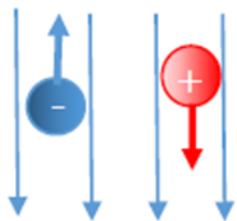
We will try to explain why comets have two tails and why these tails have a different form. The physics factors influenced on tail's form are:

1. Light is an electromagnetic wave.



According to the Maxwell laws for electrodynamics, the electromagnetic wave propagation and electric and magnetic fields, which propagate perpendicular to one another.

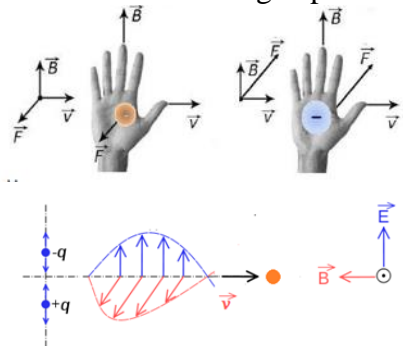
2. Movement of charged particles in an electric field.



$$\vec{F} = q\vec{E}$$

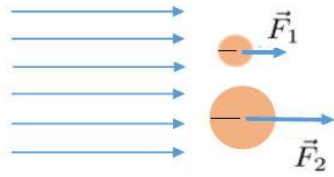
If a charged particle come to a homogeneous electric field it will work force resulting that the particle will be change its speed. The force acting on a positive charge will be in the direction of the field, and a negative charge - the opposite of the field.

3. Movement of charged particles in a magnetic



It starts to work force of the charged particle, which is moving in a magnetic field, perpendicular to the direction of the magnetic field and the direction of movement of the particle. As a result it changes the speed and the pulse, there arises a magnetic force and the particle is displaced in the same direction as the light. If the particle is negative, the electric field causes it to move in the opposite direction, but the magnetic force will not change.

What effect have light pressure on dust from a comet's tail?



To answer on this question we are going to examine the effect of light on two dust particles from a comet's tail, with different masses and different radii as $r_2 = 2r_1$.

The mass of dust in this case are:

$$m_1 = \rho \cdot V_1 ; \quad V_1 = \frac{4}{3}\pi r_1^3 \quad m_2 = \rho \cdot V_2 ; \quad V_2 = \frac{4}{3}\pi r_2^3$$

At the same time, the pressure of the light $P = \frac{F}{S}$ is the same for both dust and the force with which the pressure acts on the light dust particles is: $F_1 = P \cdot S_1 = P \cdot \pi r_1^2$ and $F_2 = P \cdot S_2 = P \cdot \pi r_2^2 = P \cdot 4\pi r_1^2 = 4 \cdot P \cdot \pi r_1^2 = 4F_1$

Therefore, the power acting on the second atom is: $F_2 = 4F_1$

Now, let's follow the accelerations of the two particles, which we assume to have the same densities. According to the second principle of mechanics, $F = m \cdot a$, $\rightarrow a = \frac{F}{m}$. Accordingly, the acceleration of each particle is:

$$a_1 = \frac{F_1}{m_1} = \frac{P \pi r_1^2}{\rho \cdot \frac{4}{3}\pi r_1^3} = \frac{3P}{4r_1\rho} \quad \text{and} \quad a_2 = \frac{F_2}{m_2} = \frac{P \pi r_2^2}{\rho \cdot \frac{4}{3}\pi r_2^3} = \frac{3P}{4r_2\rho} \quad \rightarrow \quad a_2 = \frac{1}{2} a_1$$

It turns out that the atom with bigger size moves with two-fold less acceleration. Although the power which light pressure acts on this atom is 4 times bigger, the mass is decisive for its acceleration. That is why different dust from the tail of the comet have different trajectory.



Снимка: NASA - Comet McNaught

When comets pass near the Sun they can be seen with the naked eye as coma and tails reflect sunlight. But most comets are too small and too weak to be seen.

In their movement they leave traces of debris behind them, which can lead to meteor shower, as a meteor stream. **Perseids** observed every year between August 9 and August 13, when the Earth passes through the orbit of Comet Swift-Tuttle.

3.2. Comets' movement:

Comets move in highly flattened elliptical orbits whose farthest point from the sun - aphelion often lie beyond the Pluto orbit. As they move through the solar system, they are affected by the gravity caused by their interaction with the Sun. According to Newton's law of gravitation:

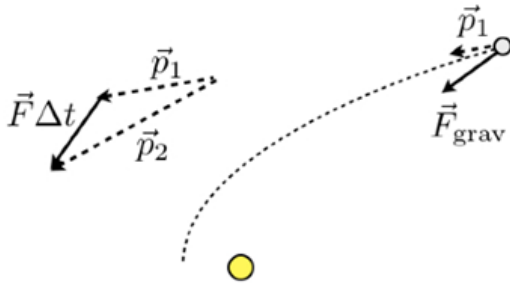
$$\vec{F}_{\text{grav}} = -G \frac{m_S m_c}{r^2} \hat{r}$$

In this expression $\gamma = 6,67 \cdot 10^{-11} \text{ N} \cdot \text{m}^2 \cdot \text{kg}^{-2}$ is the gravitational constant, m_s m_c – The masses of the Sun and the comet moving around it. According to the third principle of the mechanics the force with which the comet attracts the Sun is the same in size, but in opposite direction.

If we consider the motion of the comet at some point in the solar system according to the law of the conservation of momentum, the total momentum of the comet will be the sum of:

$$\vec{p}_2 = \vec{p}_1 + \vec{F}\Delta t$$

i.e. due to gravity the momentum of the comet and it changes its direction of motion towards the Sun:

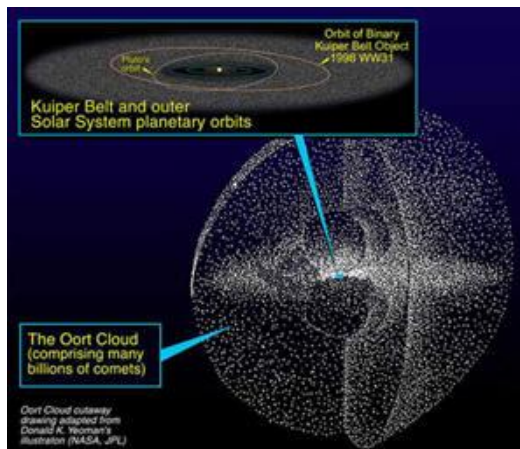


The Orbital periods of the comets can vary from a few years to hundreds of thousands of years. Those with a short period originate from the Kuiper belt, or its associated scattered disc, located beyond the orbit of Neptune. Those with a longer period originate from the Oort cloud - a spherical cloud of icy bodies in the outer Solar System. Short-period comets after multiple

passages through the inner Solar System lose their outer layer due to evaporation and it is difficult to distinguish them from asteroids.

Rare comets with hyperbolic orbits pass through the inner Solar System once, and then are released into interstellar space.

3.3. Orbital characteristics:



Comets are classified according to the duration of their orbits around the Sun.

- Short-period: with a period (lap time in their orbit) not more than 200 years.
 - long- period , with period of more than 200 years
 - Comets appearing once-comets whose orbits are outside the Solar System.
 - Comets in the main asteroid belt – it is possible that they are source of water for the inner planets.
- There is a strange kind sungrazing comets which crash directly into the Sun or go so close to it that they break down into small pieces and evaporate.

The short-period comets become active due to the active gravitational interaction between the Kuiper belt and the outer planets. The long-period comets come from almost spherical Oort cloud, which is located farther away from the Kuiper Belt.

4. Names:

By the early 20th century, most comets had been named after the year of their discovery and the brightness or season of the year was specified. For example, "The Great Comet of 1680." Daily Comet of 1882. and others.

In the early 20th - century when comets were discovered frequently, an agreement on their names still valid, was reached. The comet is named after the discovery by three independent observers. In recent years, many comets have been detected using equipment operated by large teams of scientists and therefore have the names of the equipment. For example, Comet C/1983 H1 (IRAS-Araki-Olko) was independently discovered by the IRAS satellite and amateur astronomers Japanese and George Olko (English George Alcock)

In 1994 the International Astronomical Union approved a new system of comets. Now the name of the comet includes the year of discovery a letter showing the half of the month in which the comet was detected and the number of discovery in this half of the month. The system is similar to the naming of asteroids. Before the name of the comet a prefix indicating the nature of the comet is placed. The following prefixes are used:

- P - short-period comet (comet with a period of less than 200 years.)
- C - long-period comets
- X - comet whose orbit is not exactly calculated (usually with historical comets);
- D - comets that are destroyed or lost;
- A – object sites that were wrongly perceived to be comets but were actually asteroids.

5. Study:



For the Ancient Greeks comets were enigma. Diogenes and Anaxagoras claimed that comets were clustered planets, which emit flame. Epicure considered “tailed stars” for sky bodies which move for unknown reasons, swoop to the Earth and become visible. Aristotle argued that comets were fiery formations in the upper parts of the atmosphere. Roman thinker Seneca tried to fight Aristotle’s theory and authority. He suggested that comets were sky bodies which do not dim and they just go away. But his insightful ideas were accepted as reckless.



Regiomontanus was a middle-aged astronomer who first accepted that comets were not fire forms in the atmosphere.

In 1531 the German astronomer P. Appian observed a bright comet and tracked its movement among the stars. He noted that the comet was always in the opposite of the Sun side.

In the end of the 16 century Tycho Brahe studied the movements of the comets. He organized observations of a bright comet in 1577. and discovered that it is much farther away from the moon.



Johannes Kepler was introduced to the observations of Brahe and found the reasons for the strange location of the comet tail in relation to the Sun. He indicates the pressure of the sunrays on the tails of the comets as responsible for the opposite direction of this position. This pressure pushes the comet material far behind the head of the comet.

Isaac Newton discovered that comets move in elliptical orbits around the Sun. He suggested that they could return again. According to Newton comets were compact, solid and unbreakable bodies with tails from water vapor separated from the nucleus under the influence of the Sun. What is interesting is his belief that comets are necessary to maintain the water balance of the planets and "Life supporting Spirit" in the air.

In 1846, observed how the comet Biela split into two pieces, lost after 1852. This led to the theory that comets are composed of rocks covered with ice. But this theory can not explain how in the presence of little ice evaporation continues chering the repeated passes through the comet's perihelion.



In 1950, Fred Whipple offered a new theory of comets. According to it they are constructed mostly of ice with a small admixture of dust and rocks - like a "ball of dirty snow." The theory find support in the scientific middle.

The theory is confirmed in the mission of the European Space Agency "Giotto missions Vega 1 and Vega 2 of USSR and the Japanese "Suisei" and "Sakigake" visited Halley's comet in 1986, and captured its nucleus and jets of evaporable material.

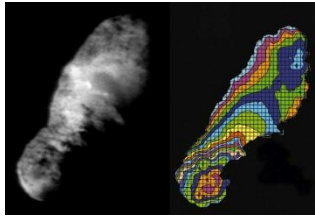


At the missions Vega, there are and Bulgarian instrumentations constructed under the guidance of Academician Dimitar Mishev, for study of the optical characteristics of the comet, of its dust and neutral gas emissions, of its plasma and electromagnetic characteristics.

NASA's Stardust Apparatus launched in February 1999, collected particles from the atmosphere of 81P/Wild comet in January 2004, and returned to Earth in January 2006. In 2009, NASA announced that the samples of the mission, gathered from Comet Wild 2 contain amino acid glycine- the building block of life.



In 2005, the apparatus Deep Impact put in working condition a special module that collided with the nucleus of Comet Tempel 1, revealing its inner structure.



In 2001, the team of NASA Deep Space 1 received images of the surface of comet Borelli with a HD resolution. They reported, that the comet has a tail, though its dry and hot surface. It is assumed that there is an ice, hidden inside.

In 2014, the ESA apparatus Rosetta will enter orbit around the comet 67P/Churumov-Gerasimenko and will explore it with a submersible unit.



With a look to the future missions at different comets, is expected more information to be revealed about their structure and evolution. It is expected the hypothesis that comets are the reason for the presence of water and life on Earth, to be confirmed.

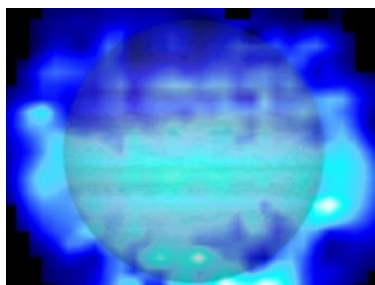
Nevertheless, comets can be and dangerous. Since its formation, the Earth is bombarded by comets. 65 million years ago, the dinosaurs may have been wiped out from the planet after a collision with a comet with a diameter of about 10 km. Although the Earth has been bombarded for billions of years, until now are found only 174 traces of collisions. The others traces may have disappeared as a result of erosion, hidden by plants or lie beneath the sea surface. Moreover, even today comets pass too near to the Earth's orbit and the danger of collisions is always there. New systems of telescopes with powerful cameras helps detect small, but big enough for the destruction of the city or country, comets. Earth has a natural protection from such collisions - the planet Jupiter. The Giant of the Solar System is a guard through icy wanderers, attracting them and shredding them with its gravity. That is why we are going to tell you about Jupiter t's collisions with comets.

In July 1994, the Comet Shoemaker - Levy 9 gets really close to Jupiter and is ruptured



into fragments under the gravity of the planet. Those fragments flow into Jupiter's atmosphere with a speed of 64km / h and create powerful cloud structures. From 16th to 22th of July, 21 fragments fall in the southern hemisphere of Jupiter, which is then at the opposite side to the

Earth. The predicted fall of the comet is observed by the camera "Galileo", at distance 1.6 AU from Jupiter. Changes in the atmosphere of Jupiter are observed from the Earth. At the collision of the first fragment with Jupiter on July 16 at 20:16-UTC, an explosion occurs with a temperature of 24 000 K and a gas cloud, a result of the explosion, rises to a height of 3000 km and is observed from Earth. The largest fragment of the comet collides with Jupiter's atmosphere in July 18 at 7:34 UTC. After the impact, a dark spot with a diameter of 12 000 km (the diameter of the Earth), which releases energy as 6 million megatons in TNT equivalent (750 times more than the entire nuclear arsenal accumulated on the planet Earth) is created. The fall of Shoemaker - Levy 9 on Jupiter is observed for a week, but the chemical impact on the atmosphere of Jupiter lasted much longer.



In 1997, the Infrared Space Observatory - ISO of ESA, found water steam in the stratosphere of Jupiter. The astronomers suspect that this is a result of the impact with the SL9 comet. After almost twenty years since the crash with this comet, Herschel telescope also discovered an abundance of water in the



stratosphere of Jupiter. According to the observations, the water is asymmetrically distributed in the north-south direction. This means that 95% of the water observed at Jupiter comes from the comet.

In July 2009 and August 2010, amateur astronomers from Australia and Japan also witnessed clashes of Jupiter with celestial bodies. In the searching for traces of collisions NASA joins the team. The U.S. space agency after observations with infrared telescope IRTF

(Infra-Red Telescope Facility) confirmed that the body has collapsed on Jupiter comet.

In 2011, after the processing of data from space drills "Cassini", "Galileo" and "New Horizons", astronomers came to the conclusion that collisions of comets with Jupiter and Saturn leave "strange" wavy traces on their "water rings". The gravitational forces of the giant planets are able to tear apart the fragile comets, and afterwards the debris from the "mangled" comets may cause the effect seen on the rings of the two planets.

It seems that the solar system is a much more dynamic place than it was assumed. It was unknown that collisions of comets and asteroids with the rings of planets - giants are very common. While Earth's collisions are very rare for the guardian of our planet - Jupiter, collisions occur several times a decade.

6. The comets of 2013

Exactly 270 years after famous 1743 we are again witnesses to the passage of three comets. We tried to "catch a comet" by observing with binoculars and telescope. In 2010 a NEXSTAR 5 Telescope Schmidt-Cassegrain with diameter of the mirror $D=125$ mm was bought for our school. This happened due to the project "A Look at the Cosmos" from the America for Bulgaria Foundation. We managed to observe the comets PANSTARRS-C/2011 L4 and C/2012 F6 (LEMMON) and take few pictures.

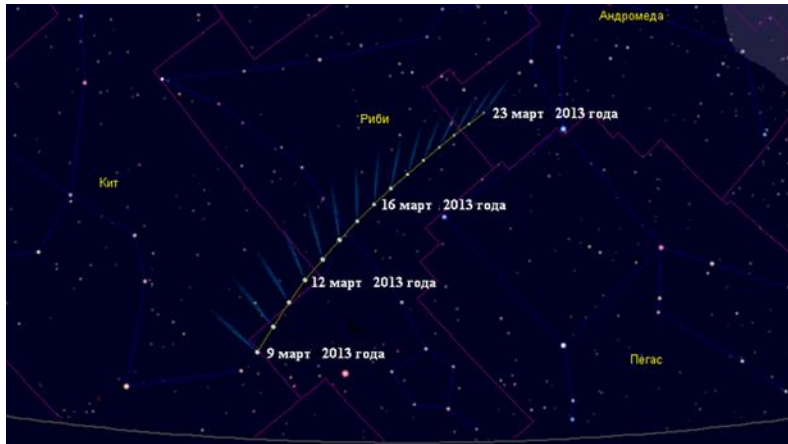
The comet PANSTARRS – C/2011 L4

The comet PANSTARRS-C/2011 L4 was discovered in June 2011 with a telescope of the system Pan-STARRS which is located at the summit of Haleakalā ("house of the sun") on Maui, Hawaii. At the moment of its discovery the comet was with an apparent magnitude of 19. By early May 2012, the comet had brightened to magnitude 13.5. The absolute magnitude of the comet in October 2012 reaches 3,46 m, the apparent magnitude – 12,2. From February 2012 to October 2012 the comet increased from 50,000 km to 120,000 km.

On March 5, 2013 the comet was suited at a distance of 1.09 AU from the Earth. It came to perihelion on March 10, 2013.

It is believed that, like the most comets, the PANSTARRS is coming from the Oort cloud. According to calculations made by astronomers after its passage during the perihelion the comet's orbital period is around 110 000 years.

The path of the comet on the starry sky is from the March 9 to the March 23, 2013.



The comet reaches its maximum brightness in March 2013, when it passed through the perihelion. Its brightness increased to 2m, and the tail spread out around 10-15 °. The comet passes closest to the Earth on March 5 on a distance of 164.1 million kilometers but at that time it was not possible to observe it. On 18 and 19 March we tried to



observe the comet but unfortunately the weather was bad. However, on March 18 we managed to catch a glimpse of it for 2-3 minutes, but while we were enjoying the view and preparing to take photos, the comet hid behind the clouds. On March 22 C/2011 L4 passed through constellation Andromeda and was observed in the morning before sunrise, low in the northeastern sky. In the evenings on 3 to 5 April after 21h for Sofia (or in the morning around 6h 10 min) is observed the passage of

PANSTARRS near the Andromeda Galaxy. On April 9 C/2011 moved in constellation Cassiopeia. On April 30 C/2011 L4 moved in constellation Cepheus and with this ended the most interesting part of the visible path of this comet.

The comet C/2012 F6 (LEMMON)



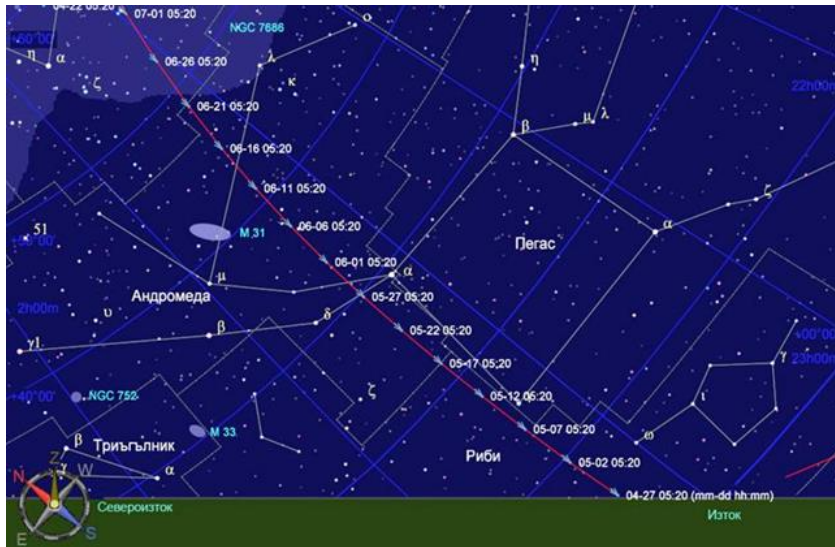
The unusual bright-green colored comet LEMMON is with number C/2012 F6. The comet's bright-color of radiance is determined by gases that are inside its core. With its approaching to the Sun, the comet gets warm and starts releasing carbon and cyan. These ionized gases and their chemical compounds are shining in green color. The comet LEMMON was discovered on 23 March 2012 at Mount Lemmon, Arizona (USA). It moves in an elliptical orbit with a period of eleven thousand years. The

best time to be seen is from late April to early June 2013.

The comet LEMMON passes through its perihelion during March 2013. It was at its closest distance to the Sun at 24th of May afternoon, at apsis distance of 109,4 million kilometers. The comet was brightest close to the date of its apsis, in between 4,5 and 9m.

In Bulgaria, the comet C/2012 F6 (Lemmon) is available for observation after April 25th, as it is rising 1 hour and 20 minutes before the Sun in the constellation Pisces. If you are lucky, you can observe the comet with binoculars or a small telescope. On May 9th, in the morning, the comet F6 (Lemmon) is at 1o 17' east from the star Algenib, γ Pegasus. About 8th of June, in

several consecutive days, the comet can be traced at its near passage to the M31 Andromeda galaxy, about 5° in west direction of the Galaxy.



The Lemmon comet is slowly moving at the south celestial sphere. ESO Very Large Telescope tested its new laser on 14 February 2013.

The visible path of comet C/2012 F6 (Lemmon) for an

observer of our country from late April to early July 2013.



The comet ISON (C/2012 S1)

It is expected to be the brightest comet of the year and even of the decade. Moreover according to some scientists it may be the astronomical event of the century. It is discovered by a Russian astronomer Artyom Novichonok and his Belarusian colleague Vitaly Nevsky, on September 21, 2012. According to recent calculations, in the night of November 28, ISON will pass at 1.4 million kilometers distance from the Sun, and then it will be the brightest star. Its light will not only reach the glow of the moon, but it can become 15 times brighter. Additionally, it is possible the dust from the comet's tail, while passing near the Earth, to create a meteor stream. Paul Wiegert, a meteor researcher at the university of western Ontario, claims that the mots which are moving with the speed of 201 168 kilometers per hour when entered the atmosphere will immediately slow down. Some researchers expect that ISON may have a unique length of the tail and that it will mark the half visible sky. It is assumed that the ISON comet has arrived from the inner Solar System, probably from the Oort cloud. It moves in a parabolic orbit, right against the Sun, and perhaps its trajectory will bring it to a “hot death”. If ISON survives the collision with the Sun, thousands years will pass before the returning of this comet near our planet.



Comet C/2012 S1 (ISON) in October, November and December.

In October the comet will reach magnitude of 6 and will be visible to the naked eye. At the beginning of October it can be observed before Sunrise in the constellation Leo. On November 5, C/2012 S1 will move in the constellation Virgo, where the bright part of its visible path will begin. Moreover, on November 21 C/2012 S1 will pass near the Earth at a distance of 0,856 astronomical units (about 128 million kilometers). Additionally, on November 22 C/2012 S1 will move in constellation Libra and will be observed in the morning dawn. C/2012 S1 (ISON) will pass through its apsis on November, at a distance only of 0,01245 astronomical units (about 1,86 million km) from the Sun. The forecasts about its brightness vary from 3m to 12m. In the dates around its apsis, the head and the halo of the comet will be not visible, because of its closeness to the Sun, but it is very likely a long tale to be formed, visible in the sky at the southeast. During its apsis, C/2012 S1 will change dramatically its direction and it will be visible in the mornings before sunrise over the southeastern horizon. The comet will pass through the constellation Scorpio, Ophiuchus, Serpens, Hercules and Coma Berences. Its brightness will get weaker but it can be observed at the beginning and the end of the night. In the last nights of December and the beginning of 2014, C/2012 S1 (ISON) will be observed in the constellation Draco.

We tried to “catch” photos and memories of the comet for our researches.

<http://comets2013.ivan-vazov.info/index%20-%20en.html>

We described and presented the result in a site in which you can receive important and interesting information about them. And if you decide to check your knowledge, there is a test in the site, where you can do this . With this site we came close to the past curious Bulgarians who were noticing the celestial guest in their chronicle. But we managed to come close to the comets with the help of the modern telescope of our school which is bought by America for Bulgaria Foundation.

We look forward to “catch” the comet ISON on the annual autumn astroparty in Varshets, in which take part lovers of the astronomy from all over Bulgaria.

7. References

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