

# NOVAE

[According to 'MATTER (Re-examined)']

Nainan K. Varghese, matterdoc@gmail.com  
<http://www.matterdoc.info>

*Abstract:* Towards the end of its stable life, a 'black hole' becomes quasar and pulsar. Activities of quasar or pulsar are managed by cyclic outward and inward radial motion of universal medium from or towards its central region. Relative motion of universal medium acts as inertial effort on 3D matter-particles. As and when outer envelope (mantle) of a pulsar is unable to withstand outward effort due to increase in its internal pressure and due to outward displacement of universal medium, the pulsar explodes as a super nova. Intense external pressure on 3D matter-particles causes matter-cores of their photons to merge and form very high-frequency photons.

*Keywords:* Black hole, pulsar, quasar, nova

## Evolution of black hole:

A black hole, in stable state, continues to collapse under gravitational attraction between its 3D matter-particles. Shrinking of its body increases internal pressure that compels 3D matter-particles to discard their matter-contents into universal medium in the form of free quanta of matter. Reduction in matter-content expands their volume and leads to further increase in internal pressure. Most of free quanta of matter, discarded from 3D matter-particles, form disturbances in universal medium. Some of free quanta of matter, discarded from 3D matter-particles, migrate into universal medium to expand its fabric. Outward expansion of universal medium acts as gravitational repulsion on black hole, from its central region towards outer periphery. This inertial action maintains its outward radial direction throughout stable state of black hole and acts against its gravitational collapse.

High-frequency photons, created from disturbances formed in universal medium, radiate from the region of black hole. In stable state of black hole (its total matter-content being very high), gravitational attraction between black hole and photons tends to retard all radiated photons from its region. Attempt to reduce linear speed of photon reduces its matter-content, rather than reduce its linear speed. 3D matter-content of all these photons are reverted back into universal medium. As a consequence, black hole becomes invisible.

As and when total matter-content of a black hole diminishes to lower values, remnants of very high-frequency photons start escaping influence of gravitational attraction (between them and black hole) in the form of very low-frequency photons. Black hole may start to appear as reddish object in space. Black

hole will not remain invisible anymore. Initially, photons escaping gravitational influence of black hole are of low frequency and they are remnants of very high-frequency photons. As matter content of black hole decreases, photons of higher frequency also are included in radiation and its brightness gradually increases. From the time a black hole becomes a visible object, it is usually called by other names.

Since internal pressure in central region of black hole is greater, 3D matter-bodies in this region start to revert, initially to liquid physical state and then to gaseous physical state. A black hole, in this state, has an external gaseous envelope, (a solid or liquid exterior), a fluid interior and a gaseous central region. (This is the state of most planet-sized macro bodies. Larger macro bodies may not have outer solid or liquid exterior at all).

As a black hole is a very huge macro body, its exterior cover is very far from central region. Difference between internal pressure at its exterior cover and central region may differ widely and help to maintain its exterior cover in viscous state. Internal pressure of a black hole, towards its central region is very high (due to the high rate of its gravitational collapse and due to high rate of expansion of atomic and subatomic particles), so that atoms are reduced to very low matter-content level. Towards end of stable life of black hole, bonds between nuclei and orbiting electrons of atoms in central region become very weak and atoms start to lose their orbital electrons, to change material elements into plasma physical state. Loss of electronic envelopes by some of the atoms reduces their size drastically and relieves high internal pressure in surrounding region of universal medium. This gives additional space for further expansion by neighbouring atoms.

Conversion of material elements into plasma state takes place only at the central region of a black hole. After conversion of material elements into plasma state has started and internal pressure in surrounding region has reduced drastically, matter-content released into surroundings by 3D matter-particles are readily absorbed back by atoms in plasma state. There will not be enough free quanta of matter, left in the region, to form disturbances or new photons. Hence, there is very little radiation from central region of black hole, where material elements exist in plasma state. This state of a black hole can continue to be stable only as long as gravitational collapse can sustain internal pressure at appropriate level. At the same time, conversion of atoms into plasma state and corresponding reduction in volume tend to reduce internal pressure of black hole. Space vacated by atoms (being converted into plasma state) is occupied by collapse of surrounding exterior part (in other physical states). This arrangement allows simultaneous heating of surrounding exterior body and cooling of black hole's central region.

A stage will come, when (due to lowered rest mass of black hole) rate of its gravitational collapse and disbursal of matter-content from very high-frequency photons in radiation (due to gravitational attraction) diminish. The macro body is no longer a black hole. Initially, very high-frequency photons escape as low-frequency photons. Gradually frequencies of radiated photons increase to include higher spectrum.

Reduction in space, available in central region, by gravitational collapse of exterior cover and expansion of atoms in central region cannot compensate space evacuated by loss of orbital electrons in atoms. Additional free space lowers internal pressure in central region. Atoms in central region suddenly find themselves in a low-pressure region and start to absorb quanta of matter from surrounding universal medium. Matter-content levels of subatomic particles increase. They cool down and diminish in sizes. Reduction in their sizes (reduced sizes of atomic nuclei), enhance pressure-reduction in the region. Atoms in this region now absorb all free quanta of matter available in the region and more from universal medium. Very few or no photons are created and radiated from this region. Macro body becomes dark. Central region of macro body now appears dark and cool. It will be cooling down at very high rate.

High rate of depletion of universal medium in central region of macro body, due to absorption of quanta of matter by 3D matter-particles in the region, produces a constant motion of universal medium towards center of macro body, in an attempt to maintain its continuity. Constant inward motion of universal medium, towards a center point is similar to inward 'radial inertial action'. Inertial action is inward and acts as an additional compression on exterior cover of macro body. It aids its gravitational collapse. Together, they maintain collapse of macro body at a rate, sufficient to sustain its internal

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pressure without much variation. Space vacated by atoms, converting themselves into plasma state, is matched by expansion of surrounding 3D matter-particles, due to loss of their matter-content and contraction of black hole's exterior cover, due to gravitational collapse.

Atoms in central region rebuild by acquiring lost electrons. As and when most atoms in central region regain their electronic envelopes, they are at much higher matter-content level and of much smaller sizes. Rebuilding of atoms gives a sudden boost to the volume of space occupied by them. Building up of atoms (in the central region of macro body) along with continuous gravitational collapse of exterior cover, increases internal pressure at very high rate. In the mean time, exterior cover of black hole has contracted by a great extent and settled down on a relatively smaller central region. Contraction of exterior cover, in conjunction with rebuilding of atoms in central region, leads to a sudden reduction in inter-particle space, available in central region and boosts internal pressure there.

Once again, heating process starts and 3D matter-particles in central region starts to expand rapidly. Atoms at the central region, getting heated, discard quanta of matter into universal medium. Now, there is excess of free quanta of matter in central region, which form photons and radiate away to make macro body, visible to out-side observers. Low-frequency spectrum of radiation enhances heating process in surroundings of central region. Fabric of universal medium does not move inward, towards the central region of black hole, any more. Inward inertial actions on exterior cover, due to radial motion of universal medium, end.

Many of excess free quanta of matter, in central region, migrate into universal medium to enlarge its fabric in the region. Universal medium tend to expand outward and cause relative displacement between universal medium and exterior cover of macro body. Outward radial motion of universal medium from central region produces an inertial action similar to gravitational repulsion on exterior cover.

#### **Quasars and Pulsars:**

These stages, of heating and cooling, repeat cyclically as long as exterior cover of macro body can withstand outward efforts exerted by internal pressure and outward inertial action by moving universal medium. If central region of macro body is comparatively smaller, exterior cover may withstand internal pressure, generated during heating stage of central region. In such cases, internal pressure in central region increases until atoms start their conversion, again, into plasma state. This will start a new cycle of cooling. In this way, central region of a macro body (remnant of a smaller black hole) can heat up and cool down in rapid succession. During heating process, photons of very high-frequency are radiated from macro body's central region. During cooling process, no photons are radiated from central region of macro body.

Due to rapid changes in internal pressure, remnant of a black hole may radiate very high frequency photons periodically in a cyclic order. Intensity and duration of radiations are related to parameters of exterior cover of the macro body. Many of the photons, radiated from central region, may be the result of breakdown of its primary 3D matter-particles. These photons start with extremely high-frequency (cosmic rays) and are able to partially survive gravitational effects due to excessive matter content of macro body. They are likely to escape gravitational effects towards macro body with a considerable part of their matter-content intact, to reach outside observers as high-frequency radiation.

Rapidity of radiation-cycle depends on matter-content of macro body. Cycle of heating and cooling of macro body's central region continue until matter content of macro body has reduced considerably. During heating, high-frequency photons are radiated from the region of macro body and during cooling, macro body becomes invisible (with no radiation from its region). Depending on the length of radiation-cycle, these macro bodies, radiating (high-frequency) photons periodically are called by various names; like, 'quasars', 'pulsars', etc. Quasars have very long periodic cycle by which radiations from their region of space may last for considerable length of time. Whereas, pulsars have very rapid cycles of radiation and silent period.

Unlike, a stable black hole that helps to revert matter from its 3D state (photons) to 1D state (quanta of matter), quasars and pulsars helps to create high-frequency photons (basic 3D matter-particles) from

1D quanta of matter. They do this during every pulse, for a long period during their life, by cyclically absorbing and discarding quanta of matter from surrounding universal medium. Unlike black holes, which help to revert 3D matter from basic 3D matter-particles into universal medium, quasars and pulsars help to create basic 3D matter particles (photons) from universal medium at very high rate.

#### **Novae:**

Gravitational collapse of large macro body is a gradual process. Explosion or implosion can take place only under sudden changes, where outer crust cannot maintain stability against changes in internal pressure. Therefore, huge explosions (like a nova) require additional outward impulses, in addition to increase in internal pressure during heating.

A nova is caused by huge explosion of an extremely large macro body, like a very massive star or a black hole, in space. An explosion takes place when a body's outer cover (preferably in solid or very dense liquid physical state) cannot withstand sudden and very high outward radial effort, created within. During gravitational collapse of a very large macro body, it is heated from within. This is a gradual process and since whole of macro body is made of similar material, usually its outer cover is also heated, but at a lesser rate, corresponding to macro body's volume. Therefore, mere internal heating alone cannot produce an explosion of the scale, required for a nova. Development of excessive internal pressure may at the most be able to crack open outer crust of the macro body or splinter it into few segments until internal pressure is relieved (like volcano on earth). In order to drive splintered parts away from centre of explosion, far out into space in all directions, additional outward radial effort from central region of macro body is required.

As frequency of pulses increase, exterior cover of pulsar is literally shaken. Unless, shrunken exterior cover can withstand combined outward effort by rapidly rising internal pressure and outward-flowing universal medium, the pulsar explodes. Most probably, (spinning) pulsar disintegrates into smaller fragments, which fly away over a very large region in space. Splintered fragments are not only thrown outwards by explosion but they are also carried away by outward-moving universal medium. This is the mechanism of explosion of a 'super nova'.

Internal pressure within a pulsar, at the time of its explosion, is extremely high. No subatomic particles can survive at extremely high pressure created at the time of explosion of a nova. Low matter content level, in conjunction with high external pressure, breakdown nucleons to release their constituent primary matter-particles, free. Photons of primary matter-particles are driven nearer, to merge their matter-contents. Merger of their matter-contents creates photons of very high matter-content, which are radiated along with other radiations and debris. Thus, large quantities of 3D matter-particles are reverted into very high-frequency photons (cosmic rays). Matter-contents of these photons revert into universal medium, in due course of time. Each super nova reduces 3D matter in universe by a large quantity. This is how 3D matter is reverted into 1D matter of universal medium, in nature.

Cyclic pulsing actions by universal medium may continue for a long time before outward inertial action become capable to explode exterior cover of pulsar and carry its fragments far out into space. Splintered fragments continue their outward motions until their motion can be arrested by mutual gravitational attractions or they fall into other macro bodies in space.

At no stage in the evolution of stellar macro bodies, a matter-body, equivalent of a neutron can be envisaged. A neutron is a subatomic matter-particle with definite components, structure and size. Combination of a proton and an electron does not make a neutron. They will partly annihilate each other. A larger or heavier neutron cannot be formed. Consequently, assumptions of 'neutron stars' and similar macro bodies should be treated as pure imaginations.

#### **Reference:**

- [1] Nainan K. Varghese, 'MATTER (Re-examined)', <http://www.matterdoc.info>

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