



How the ball lightning enters the room through the window panes



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ARTICLE INFO

Article history:

Received 17 February 2016

Accepted 13 April 2016

Keywords:

Ball lightning

Fire ball

Nonlinear optical medium

ABSTRACT

It is shown that Ball Lightning in a form of a self-confined light consisting of a thin spherical layer of a strongly compressed air where an intensive white light is circulating in all possible directions can penetrate into room through window panes. Only light penetrates through the pane. The compressed air cannot penetrate through the pane. But the air is located indoor in the room. The light compresses this air indoor in the same manner as it compressed the air outdoor. No plasma is connected with the natural Ball Lightning.

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1. Introduction

Currently, it is well established that Ball Lightning (BL) can penetrate through window glass, sometimes destroying them, but in most cases leaving them intact. A damage, if any, is local in nature and is in that region, through which BL penetrated. In work [1], 43 cases of penetration BL indoors are described. It should be noted that a vast majority of BL theories cannot explain this BL property and therefore must be rejected. This applies to all theories where any particles: electrons, ions, clusters, plasmas and so on are used. It is known that the particles cannot penetrate through glass. Glass flasks and test tubes used in the chemistry, as well as glass cathode ray TV tubes through that cannot pass electron are a good confirmation of this.

We consider an object that can be characterized in modern terminology as an optical incoherent spherical space soliton (SSS) [2] that can penetrate in room through windowpane. SSS can be imagined as a thin spherical layer of the strongly compressed air where the conventional white light is circulating in all possible directions. The refractive index of the layer is greater than that of the surrounding space and the layer shows itself as a planar lightguide, the curvature of which is different from zero. The lightguide prevents radiation of light in free space. In turn, the circulating light compresses the air due to the electrostriction pressure. The energy of the light is significantly greater than the energy of the compressed gas. As a result, the behavior of the SSS obeys the laws of optics rather than laws of mechanics. This facts explains puzzling and intriguing behavior of Ball Lightnings in atmosphere.

In accordance with the Snell law, the light beam propagating in an inhomogeneous optical medium deflects in the direction of the gradient of the refractive index of the medium. In this case, SSS located in an inhomogeneous optical medium in a form of conventional terrestrial atmosphere moves along the gradient of the refractive index of the air.

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Unlike a child balloon where the air pressure within the balloon is greater than the outside pressure, the pressures within and outside SSS are identical. This provides the great deformability to SSS. If SSS is located in the air, the gradient of the refractive index of which is changed noticeably at the distance that is comparable with SSS size, SSS is subject to deformation.

SSS is the very sensitive device for determination of the air inhomogeneity. Indeed, the light makes about billion revolutions per second. If the displacement of SSS is equal to 1 nm per one revolution then SSS moves at 1 m per one second. That is why speeds of natural Ball Lightnings vary in a wide range.

The noticeable change of the gradient takes place near any obstacle. In this case, SSS heats up the obstacle due to the absorption of the light radiated by SSS. The obstacle heat up layers of surrounding air due to the heat conductivity. As a result, the refractive index in these layers decreases and the gradient is directed from the obstacle. Moving along the gradient, SSS bypasses the obstacle.

Usually, any holes and slots are located between two regions where the temperature of the air can be different. As a result, the gradient of the temperature and, therefore, the gradient of the refractive index takes place near the holes and slots. That is why SSS is not indifferent to the holes and slot. Any window can be considered as a hole confined by a windowpane. The homogeneity of the air is violated near a window in the same reason as that is violated near an open hole.

These obvious and simplest properties of SSS are sufficient to explain the abnormal behavior of natural Ball Lightning [3–13]. Below we will consider in detail a process of penetration of SSS through window panes. This process is not able to explain most of the known theories. That is why the last recent theory [14] is focused on the explanation of the process

2. Evidence of eyewitnesses

There is numerous evidence of eyewitnesses about Ball Lightning penetration through windowpanes [15,16]. We present several cases taken from these sources to show that this BL property is a reliable fact. The eyewitness saw a fire ball 10–15 cm in diameter that pass into the room through upper glass, flying slowly in the direction of the nearby table, above which it exploded producing sound as loud as a cannon report. No one suffered, but telephone and electric wires in the room were melted. There was no hole in the window glass through which the ball had passed.”

“A few seconds after a close discharge of lightning we saw outside behind a window a bright luminous ball the size of a fist moving downward along a curved trajectory. This luminous ball passed into the room through the glass of a closed window, moved one meter into the room, made a 90° turn, moved further into the room parallel to the wall and then disappeared with a sharp loud blast. The ball had a violet-and-blue color tinged with red. The observation lasted three seconds. The ball caused no damage either inside or outside the room. After the explosion, there remained an odor typical for electric discharges.”

KC-97 USAF tanker airplane was on a blind flight in the clouds at an altitude of 5400 m. There was weak precipitation with a temperature above 0 °C. St. Elmo lights appeared at the binding of the front windows. The pilot saw a yellow, white ball penetrates inside through the windscreen passing between him and the second pilot at a speed of a running man. The pilot waited tensely for an explosion to come. The ball flew along the passage, passing the navigator and the flight mechanic. In approximately three seconds, the regulars reported by intercom from the rear compartment that a fireball had rolled through the rear compartment and disappeared into the clouds moving along the right wing. The ball did not produce any sounds.

“Suddenly, during a strong discharge, a little ball, that looked very much like a bright electric ball light of 100 W, flew in through the window glass. It flew over the elder son’s head 0.5 m from him, then lowered a little towards the furnace. The ball moved rather fast, but at the same time somewhat smoothly since we all distinctly saw a bright ball, not just a glaring line. The ball turned back from the furnace and, after flying a little backward, exploded near my feet (15 cm above the floor and 8–10 cm from my leg). I was barefoot but felt no heat. As for the sound, it was like someone had smashed an electric bulb. I observed the ball lightning not very long, 3–5 s. I stood up to check the glass. It was intact, but from the outside, there remained around the dry area, while the rest was all wet with heavy rain.”

“During a very severe thunderstorm into the room right through the window glass slowly entered a glaring little ball 4–5 cm in diameter. It passed through the glass without changing its shape as though there was no glass at all. It struck a metal ball decorating the bed, bounced back towards the window and left through the glass as slowly as it had entered. When the ball hit the bed there came a melodious sound similar to the sound of a tuning fork. It all lasted 5–7 s. The glass, through which the ball passed twice, bore no traces whatsoever.”

“I heard a cracking sound coming from the window. I raised my head and saw a fireball 8–10 cm in diameter that flew through the window glass. The ball did not change as it passed through the window. It flew directly at us and blew up between me and my son (approximately 15 cm from me). The sound was like a shot of an air rifle. My son and I were not injured. I found no hole in the window glass.”

“Through the double-glass window frame three meters from me a little fire spot entered the room, hung in the air and took the shape of a ball approximately 3 cm in diameter. Its brightness was like that of a 100 W yellow-light electric bulb. It did not move anywhere, just hung there, and later began to turn pale until it faded completely. It all lasted

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