



### F47 Caught by the Laws of Physics

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**Learning Overview:** After attending this presentation, attendees will understand a specific event, including several anomalies that led to controversial theories about the event, and how high-speed photography elucidated a serious misunderstanding of firearm dynamics.

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community by showing how an objective assessment of the evidence supported one of the competing theories of the case.

The death of a young woman several years ago in St Augustine, FL, was investigated by local law enforcement agencies. During the investigation, there was controversy regarding whether her death would be pronounced a suicide or homicide. She was killed by a single shot into her mouth by a .45 caliber handgun. The young woman also sustained an injury directly above her eye, which was just one of many anomalies in this case that initiated considerable controversy between those who supported the suicide theory and those who supported the homicide theory. One preposterous theory about the cause of the victim's eye injury was that it was caused by the firearm lurching forward, in the same direction of the bullet, upon being fired in what may be described as "negative recoil." The firearm had a tactical flashlight mounted on its proprietary under-rail, with a knurled bezel surrounding the parabolic reflector. The knurled bezel was very likely the cause of the victim's eye injury, but the question of how and when it happened needed to be explored. The Laws of Physics clearly prevent the firearm from moving forward upon being discharged, but sometimes the Laws of Physics are not well understood by those unfamiliar with them. Fortunately, high-speed photography can clarify very fast events that may otherwise evade understanding, or skepticism, in the tenets of science.

One theory of the incident proposed that the firearm lurched forward upon firing, which resulted in the bezel of the attached tactical flashlight to cause an arc-shaped injury over the victim's eye. That scenario would require the firearm to be used upside down to fire the fatal shot into the victim's mouth, almost simultaneously causing the eye injury with the aforementioned "negative recoil." This clear breach of physics can easily be visualized and disproven using high-speed photography, which was used in this project to elucidate the relative motion of the firearm and the bullet. The same model firearm and ammunition were used during several experiments concerning recoil, including supporting the firearm on strings and firing it remotely. A review of the frame-by-frame images taken during tests when the firearm was discharged revealed the bullet left and completely cleared the barrel before the slide began to move rearward. It only moved *rearward*, opposite the direction of travel of the bullet, not forward. This rearward-only motion of the firearm upon discharge obviously included the attached tactical light, contradicting notions that the tactical light caused the victim's eye injury at the same time that the fatal bullet was fired.

Other anomalous aspects of this event that will be discussed include two shots being fired at the scene and the locations of the two discharged cartridge cases with respect to the position of the firearm. Attendees may draw their own conclusions about this event after the facts are presented.

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### Suicide, Homicide, Recoil