

Episode 46: Pop and Glow

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- Travis: Welcome to Slacker Astronomy; a podcast about astronomy and just about anything else that floats over our heads.
- Pamela: Every week or so we bring you a news event from the world of astronomy, and when there is nothing new to report, we'll continue our fight to find new sponsors.
- Travis: As we start to approach conference season and star party season and the season of countless interesting things to see and do, we are starting to seek additional sponsors.
- Pamela: We love Oceanside, Photo and Telescope, and they are staying with us for a while, but our love with OPT is not a solitary thing. It wants to be shared abundantly as new ads add-up down the side of the website and new commercials crop up on the Slacker Astronomy Extra Feed.
- Travis: We know that some of you out in our listening audience may have companies that would be interested in sponsoring us. The thing is, we don't know who you are or how to contact you.
- Pamela: So we're hoping beyond hope that one or some of you might contact us and offer to be Daddy Starbucks to our Orphan Slacker.
- Travis: Interested? Email us at info@slackerastronomy.org. And, as always, for you gentle listeners interested in giving smaller dollar amounts to cover our bandwidth and software, you can make donations at our website: www.slackerastronomy.org. Your donations are what make this show happen.
- Pamela: And now, we return you, without any further commercial interruptions, to this week's episode of Slacker Astronomy, titled "Pop and Glow."
- Travis: On Feb 18, 2005 astronomers using the Swift satellite identified a long lasting, low power gamma ray burst. Dubbed GRB 060218, this unique explosion marked the death of a giant star and the formation of a black hole or magnetar in the not so distant universe.
- Pamela: Most gamma-ray bursts last for at most a few minutes, and are often only a few seconds or even just milliseconds in length. This burst, however, lasted for a startling 2000 seconds. ...
- Travis: Which for the math illiterate and lazy is over 30 minutes long. Because the burst was so long, it was possible to obtain multi-wavelength data for most of the burst. The Swift Satellite is equipped with not only the burst alert gamma-ray detecting telescope that discovered this object, but also with an X-ray

telescope and an ultraviolet/optical telescope. The satellite was able to get all three instruments on object and observing while the gamma-ray burst was in progress.

Pamela: Clearly apparent in the ultraviolet / optical telescope's images is a bright blue pinpoint of light. This glow marks the spot where the star went pop.

Travis: This bright gamma-ray afterglow was a passing event, but it was replaced a couple weeks later by a supernova that was observable to any one with a 16" telescope in a dark location. The supernova actually formed at the same time as the gamma-ray burst, but it takes time for a supernova to reach its maximum brightness.

Pamela: And this supernova is the first observed in detail from the very moment of its creation.

Travis: Both amateur and professional observers are carefully watching this object, studying its every flicker, fade and brightening to learn everything they can about this first of its kind observation.

Pamela: And, if early theoretical calculations hold true, GRB 060218 won't be the last of its kind to be observed.

Travis: This burst contained only about one-hundredth the energy of the more regularly observed bright and distant gamma-ray bursts. According to Princeton Theorist Andrew MacFadyen, these low energy events could be 30 times more common than the previously observed high-energy bursts.

Pamela: In an article in Science News, MacFadyen, a long time gamma-ray-burst theorist said he is actually going to break his normal non-observing habits and seek out an amateur astronomer who will let him take a peek at this quickly evolving event.

Travis: And for those of you wanting to take a look of your own, we have placed links to finder charts and coordinates on our website: www.slackerastronomy.org.

Pamela: This GRB originated just 440 million light-years away, which in the grand scheme of things, is right around the corner.

Travis: Size is a very relative thing. Just as a three-hour drive is a reasonable distance to go for shopping if you live in West Texas, 400 million light years is nearby for cosmologists who are used to dealing in billions of light years.

Pamela: And it's a good thing this explosion occurred so nearby. As far as gamma-ray bursts go, this star's explosion just wasn't all that luminous, and if it had been much further away it wouldn't have been bright enough for us to see.

Travis: Again, it's all a matter of scale. Although you may think the spotlights marking the grand opening of your local Quickie Mart are way the heck to bright, you would think they were all but unnoticeable if you were trying to see them from space, even if you turned off all the surrounding lights.

Pamela: So, lucky for us and especially lucky for the astronomers using Swift, this burst was in the right place at the right brightness when Swift was scanning its

part of the sky.

Travis: So, now that we've found it, what do we do with it?

Pamela: Well, we wait. Normally Slacker Astronomy wouldn't give a story like this a lot of coverage because the real science results won't be out for weeks or perhaps even months, but....

Travis: But since this thing is visible, we thought we'd let you all know so you can run out and take a look.

Pamela: Don't worry, just pause the show, go up and look, and we'll still be here when you're done.

Travis: We'll just be here twiddling our thumbs...

Pamela: Waiting patiently ...

Travis: Waiting while you observe...

Pamela: Waiting...

<pause>

Travis: And welcome back from break everyone, this is Slacker Astronomy. Today we're discussing GRB060218, a Gamma-Ray burst that lasted longer than any previously observed gamma-ray burst.

Pamela: Hmmm, didn't we say the rest of this episode was going to be uninterrupted?

Travis: WE did not interrupt the show. THEY paused the show to go observe. Their choice, not ours.

Pamela: Um, I'm not sure of your logic, but let's go with it. On with the show. . .

Travis: So, GRB060218 ... What science information do we have so far.

Pamela: Well, our good friend Phil Plait has made this story easy by providing a science synopsis on the Gamma-Ray Real Time Sky-Map, at GRB.sonoma.edu. According to his summary Swift had detected gamma-rays from this location back in January, and spectra are consistent with a supernova.

Travis: In fact GRB060218's spectra is similar to spectra of SN1998bw, another GRB-SN object.

Pamela: First came the GRB: On April 25, 1998 the Italian/Dutch BeppoSAX satellite detected a gamma-ray burst in the nearby galaxy ESO 184-82.

Travis: Next came the Supernova: Astronomers at a variety of observatories, including the now destroyed Mount Stromlo and Siding Spring Observatories, detected SN1998bw at the same location as GRB980425 about 20 days later.

Pamela: This was the first, but not the last time that both a GRB and a SN have been found in the same location and have had spectra identical to that of SN 1998bw.

Travis: All these objects have been relatively nearby, and the gamma-ray bursts have

lasted relatively long, and have marked the positions of hypernova. We have links to more data on these objects on our website.

Pamela: So, while we don't have a lot of science from our friend GRB 060218, we still have some science from the class of objects it belongs to.

Travis: And when GRB 060218 does have some new information to share with the scientific community, we will bring it to you.

Pamela: But for now, we leave you with a few extra minutes in your day, and the knowledge that we have lots of content sitting over on our Slacker Extra feed just waiting to be heard.

Travis: And as always, we'd love to hear from you. Send us your comments, criticisms, and favorite comics to info@slackerastronomy.org.

Pamela: Clear skies and clear bandwidth. This is Pamela on behalf of Travis and Aaron.

Travis: This has been Slacker Astronomy, a three-person collaboration for you, for fun, for the voices in our heads.

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