

Developing a Highly Successful Planetarium Show on Dark Matter

R. Michael Barnett

Lawrence Berkeley National Laboratory

Planetarium Show on Dark Matter



✨ <http://PhantomOfTheUniverse.org> ✨



Why a Planetarium Show?

Our original ideas

- **New avenue of public outreach.**
- **More dramatic than IMAX (it surrounds you).**
- **Great way to show galaxies, and a scene with a spiral galaxy blowing apart (without dark matter).**
- **Great way to present LHC ring (around the dome).**
- **Great way to present collisions (like fireworks raining down the planetarium walls).**



Why a Planetarium Show?

What we learned

- Hundreds of planetariums with an interest in a dark matter show (broader than ATLAS or LHC).
- They will present our show for months at a time.
- Planetariums have the perfect science-interested audience for us – students and general public.
- 110 million people a year watch planetarium shows.

None of this would have been possible with an ordinary film.



Impact Exceeded our Dreams

Seen by **>2 million** people

More than **600** planetariums in

67 countries on **6** continents (In US in **42** states)

22 languages

Dark Matter Day: Shown in many planetariums



Who started the project?

We were three physicists in the

ATLAS Experiment at the Large Hadron Collider:

Michael Barnett – Lawrence Berkeley National Lab

Kaushik De – University of Texas, Arlington

Reinhard Schwienhorst – Michigan State Univ.

**All had zero experience with
planetarium shows, so...**



Creation Required Many Professionals

- Academy Award-winning actress as narrator
- Academy award winning sound effects/editing by Skywalker Sound (Star Wars, Avatar...)
- Hollywood scriptwriter and producer
- Outstanding director
- Experts from seven planetariums
- Team of professional animators
- Nobel Prize-winning cosmologist
- Cameraperson from Adler Planetarium
- And many more...

Goal of the Show

Our show is only 25 minutes

What can we say... that the audience might retain?
(audience is students and the public)

- **The excitement of exploring science.**
- **A sense of the mystery of dark matter.**
- **How we explore mysteries in science.**
- **The tools of scientific exploration.**
- **Dark matter is real and is everywhere.**
- **More??**

Content of the Show

Typical planetarium show is 25 minutes.

We had to pick a few highlights for our story.
Could not include all aspects of Dark Matter searches.
(script written five years ago)

- **Dark matter created in the Big Bang.**
- **Evidence for dark matter in Galaxies, etc.**
- **Underground search for dark matter.**
- **Search for dark matter at the LHC.**

Animation Team

The show is 95% animation. But very realistic animation. Animators had much experience with flat screens, but not with curved screens of planetariums.



R. Michael Barnett

DPF

13 July 2021

Her Movies

Doctor Strange
Hail, Caesar!
Trainwreck
The Grand Budapest Hotel
Snowpiercer
Julia
Moonrise Kingdom
Chronicles of Narnia
Michael Clayton
Galápagos
etc.

After recording



Sound Effects & Mixing by Academy Award Winning Team at Skywalker Sound



Star Wars
Lincoln
Toy Story
Avatar
Titanic
Forest Gump
Jurassic Park

22 Languages

Catalan,
Chinese (Cantonese),
Chinese (Mandarin),
Czech,
English,
Finnish,
French,
German,
Hebrew,
Italian,
Japanese,

Korean,
Lithuanian,
Polish,
Portuguese,
Russian,
Slovak,
Spanish (Mexico),
Spanish (Spain),
Swedish (Sweden),
Swedish (Finland),
Turkish...

and probably more that we have not heard about



Free Distribution

**Distributed by the
European Southern Observatory,
which distributes many planetarium shows.
<https://www.eso.org/public/videos/potu/>**

But one has to request (via an ESO form)
a password, which I supply.



Free Distribution

> 600 planetariums in
67 countries on **6** continents.
In the US in **42** states.

Examples: London, Washington DC, Brussels, Tokyo, New York, Toronto, Munich, Athens, Rome,...

Examples: Nairobi, Luanda, Adelaide, Buenos Aires, Beijing, Quito, Mexico City, Mumbai, Tehran, Beirut, Katmandu, Auckland, St. Petersburg, Cape Town, Istanbul, Easter Island,...



Dark Matter Day

October 31 (and also earlier days in October)

**Planetariums present our dark matter show
Phantom of the Universe**

**And have a local expert to answer questions or
give a presentation.**

**The worldwide labs organizing this are also
preparing materials and resources.**

(This slide was written 2-3 years ago)

What were the reactions of students and the public to our show?



Like



Love



Haha



Wow



Sad



Angry

From directors of major planetariums in several countries:

“... a compelling planetarium show, one that I think will be **accessible to a wide variety of audiences**, and – perhaps most importantly – achieves this without diluting the scientific content or authenticity.”

“... science center staff, **high school students**, and university students ...were all extremely impressed with the show.”

From directors of major planetariums in several countries:

"We just had a great experience with **middle school boys** who were very engaged throughout the show. The visuals caused them to break out into cheers and I had thoughtful questions afterwards."

"I must say, the **content, visuals, and editing quality** of the entire production are really incredible."

Next

Dark Energy?

(under consideration, but funding is an issue)

Phantom of the Universe: The Hunt for Dark Matter

Available now for FREE
to planetariums worldwide.



We hope you might bring it to the
attention of your local planetarium.

<http://PhantomOfTheUniverse.org>
rmbarnett@LBL.gov

The End



Narration

I listened many planetarium shows and documentaries, and concluded that the best narrator I had heard was Tilda Swinton, Academy Award winning actress.

I went online and found her agent. By the time we concluded negotiations, Swinton had changed agents. But all went well.



Sound Effects and Mixing

**I had a connection who had a connection
to
Skywalker Sound**

located in Marin County near
San Francisco



Production

Production took three years

Preceded by three years for fundraising.

NSF, DOE, ATLAS, LBNL, Michigan State U.,
U of Texas Arlington, CERN, STFC (UK)