
ASTROEDU CONFERENCE 2023 – SPECIAL ISSUE
**ASTRONOMY EDUCATION PRACTICE
POSTER**

10 short astrophysical FD shows

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Abstract

The installation of a digital planetarium called Unisphere was completed at the Institute of Physics of the Silesian University in Opava in 2019. This academic planetarium is mainly used for educational purposes in shows focussing on astrophysics. One of the first projects the creative group is working on is the production of 10 short fulldome shows on very advanced astrophysical topics. The main motivation for the creation of these shows and the choice of astrophysical topics is the effort to popularise the work of scientists directly from our department. Commercial production companies do not include such topics in their shows. The shows are aimed at high school students and the general public interested in astrophysics. One of them was also presented at the Fulldome Festival in Brno <https://www.fulldomefestivalbrno.com/> and GDP 2023 in Solingen <https://galileum-solingen.de/ueber-uns/planetariums-netzwerk/gdp-tagung-2023/>.

Keywords: Planetarium, Fulldome Show, Astrophysics

1 List of shows

1.1 Accretion disk at black holes

The show provides a brief recap of the history of the term "black hole" and its connection to the evolution of very massive stars. The physical properties of the close vicinity of black holes are briefly described. (21 minutes)

1.2 Optical effects in extreme gravitational fields

This show aims to introduce the viewer to the issue of optical imaging in strong gravitational fields. The history of its modelling, first discoveries and its use in today's space exploration. (38 minutes)

1.3 Life under a black sun - exoplanets near black holes

The show consists of a walk through the Solar System, defining the habitable zone. We go over other planetary systems that may exist including the possibility of a black hole as the central body. Finally describe the criteria they must meet in order to have exoplanets capable of hosting life. (20 minutes)

1.4 Astrophysics full of extremes (temperature)

The world around us is governed by physical laws that people have been trying to formulate with increasing precision for centuries. Let's go together to the very limits of the laws of physics! Our first journey explores extreme temperatures. (15 minutes)

1.5 Accretion structures near BH and NS

The show describes the behaviour and appearance of various models of accretion disks around black holes and neutron stars in the form of an explanation with historical connotations. The principle of accretion processes and the properties of several of their physical models are explained. (20 min.)

1.6 Radiation in strong gravity

Two key physical mechanisms of radiation are explained, namely the Hawking radiation and the Penrose process. It explains that while the first phenomenon is a consequence of the analysis of quantum fields on a curved black hole background, the second physical phenomenon is classical. (15 minutes)

1.7 Cosmic microwave background

At the beginning of the show the definition of the electromagnetic spectrum and atmospheric transparency for radiation of different wavelengths is given. Afterwards the connections of our knowledge of the large-scale structure of the Universe to the properties of the CMB are presented. (18 minutes)

1.8 X-ray observational space missions

This show presents in an engaging way the history and the present of space observations in the X-ray. The development of X-ray astronomy could only occur with the development of cosmonautics, and the show presents both historical milestones and missions in which scientists from the Institute of Physics in Opava are involved. (20 minutes)

1.9 Binary systems with a neutron star

The story takes place aboard a fictional spacecraft during a journey to the Alpha Centauri system. The basic properties of the different types of binary stars are communicated through a conversation between the astronaut and the on-board artificial intelligence. (15 minutes)

1.10 Binary systems with a black hole

In the form of an informal conversation, this show explains the role of compact objects in binary systems, in particular X-ray pulsars, neutron stars with X-ray flares, and also binary systems with a black hole or with two neutron stars. (15 minutes)

1.11 Journey to the binary stars with AIDA

The show about binary stars has been translated into English and its visual design has been re-created in a more advanced version. The show was also presented at the FFB 2022 festival in Brno and GDP 2023 in Solingen. The trailer for this show can be found at FullDome Database <https://www.fddb.org/>.

All shows were produced only in Czech, but English translations of the scripts are also available. If you are interested feel free to contact us, your own translation into other languages is also possible.

<http://unisfera.slu.cz/>

<http://whoo.slu.cz/>

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