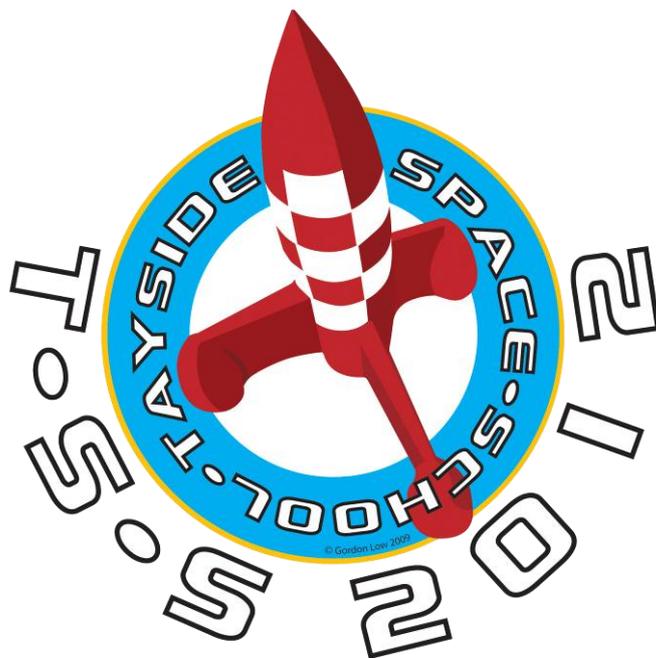


# Physics Fun in Space



A project funded by

**IOP** | Institute of Physics  
In Scotland

In association with



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of  
ABERTAY DUNDEE

## **Introduction**

The 'Physics Fun in Space' shows were delivered by staff and students from the School of Contemporary Sciences in the University of Abertay Dundee. The events were designed as an entertaining show for primary pupils lasting slightly over 1 hour where the children were exposed to various scientific principles through demonstrations and some hands-on practical experiments. While the show was largely Physics orientated it also touched on Biology and Chemistry in a few places. The event promoted science to a primary P4-7 audience in a fun and exciting manner using space and space travel as a means of introducing a variety of basic science concepts.

This report outlines the aims and objectives of the project and evaluates its success.

## **The Objectives**

The University together with various local partners currently operate the Tayside Space School where astronauts and NASA educators come over from the US and together with local primary school teachers run a series of workshops with pupils. Unfortunately this is limited to just two primary 7 pupils from each of the Dundee primary schools each year though a separate but linked programme runs with school pupils in Perth and Kinross.

It was therefore decided to develop a related outreach activity with the Institute of Physics in Scotland to enable a wider population of primary pupils in Dundee and Angus to have the same opportunity to be enthused by science through a show which loosely focused on science in space.

Objectives of the project were:

- To develop a show in conjunction with Sarah Fletcher (PT Physics at the High School of Dundee) linking basic physics principles to space travel and exploration.
- Deliver the show using undergraduate students as presenters to allow them to develop their own confidence and communication skills.
- Deliver the show to audiences that would otherwise not normally have access to such activities namely small rural schools and city schools in areas of Dundee.
- To highlight for primary teachers how physics can be delivered in a fun way through relatively simple demonstrations.
- To produce a film of the event and load it onto the Schools GLOW network for wider access.
- To publicise Physics to as wide an audience as possible.
- To involve Dundee High school pupils in running the events.

## The Delivery

The developed show consisted of a total of 42 different experiments across various areas of physics including solids, liquids, gases, vacuum conditions and pressure; forces; electricity and energy transfer and their links to space, space travel and space exploration.

Some individual experiments are illustrated below:



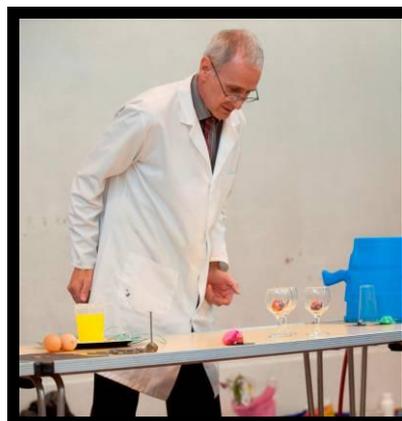
Examining the effects of liquid nitrogen and dry ice with flowers and soap films:



Effect of pressure on 'Marshmallow man' the astronaut who forgot his space suit!!.



Magdeburg Hemispheres and pressure.



An 'old conjuring trick' or just an 'old conjurer' illustrating forces and friction?

Twelve shows were undertaken to a total audience of just under 800 pupils ranging in age between P5 & P7. The schedule of events was as follows:

<u>Event</u>	<u>Date</u>
High School of Dundee (Trial of the show)	10/5/12
Colliston Village Hall (Colliston , Carmylie & Arbirlot PS)	18/5/12
Longhaugh PS Dundee	21/5/12
St Marys PS Dundee	30/5/12
Sidlawview PS Dundee	31/5/12
Newtyle PS (Newtyle, Airlie, Isla PS)	4/6/12
St Lukes & St Matthew PS Dundee	6/6/12
Lochee PS Dundee (Lochee, Charleston PS)	11/6/12
University of Abertay (Tayside Space School 2 shows)	16/6/12
Aberlemno Village Hall (Aberlemno, Tealing, Strathmartine, Inverarity PS)	18/6/12
Edzell PS (Edzell, Stracathro PS)	19/6/12

In addition to the delivery of the shows all teachers attending were provided with a Teacher Handbook explaining the scientific principles behind the experiments and expanding on some of the concepts (copies available from ([a.bruce@Abertay.ac.uk](mailto:a.bruce@Abertay.ac.uk))) and a National STEM Centre publication on ‘Using Toys and Gizmos to Support Motivational Learning’ which provides details of where some of the equipment used in the shows may be sourced. All attending pupils also left with an Institute of Physics freebie as a lasting reminder of the events.

## The Evaluation

As with any educational show of this type the greatest measure of success is the audience enjoyment of the event. We will let you make your mind up on whether you think the attendees were intrigued and had a good time based on the pictures below and given the teachers comments (in italics below) to the evaluation questionnaire.



- Objective 1 – Targeted success?

The show had the correct balance between fun and theory and just about enough references to space and space travel.

*“Lots of links to other areas of relevance in CfE”*

*“Practical activities, exciting, thought provoking”*

*“The pupils wanted to write about their learning as soon as we returned to school and were asking detailed questions about why some of the reactions occurred”*

- Objective 2 – Competent deliverers?

Although the plan had been to use more undergraduate students to independently deliver the shows only two of the four trained students later became involved on a regular basis due to other commitments including study and part-time employment. The students nevertheless were excellent and thoroughly enjoyed the experience.

*“Presenters pitched their presentation just right. They really enthused their audience”*

*“Wish I could teach science as well”*

- Objective 3 – Target Audience

The show was delivered to a wide cross section of schools and venues and met the intended demographic populations thereby enhancing the learning experience of children in such schools. Given that nearly 800 pupils and teachers were able to attend the cost to the IOP was approximately £2 per pupil given that nothing was charged for the shows.

- Objective 4 - Lasting Legacy

The production of Teacher Handbook to enhance the message and allow teachers to follow up later in class was an excellent addition to the project proposals.

*“Great to receive booklets to support learning and teaching of science in the classroom”*

*“Children had previously had topics on solids, liquids, gases, and the experiments really helped to clarify their understanding”*

- Objective 5 – Widening Access

One of the events held in Abertay was filmed and will be placed on the GLOW network in the near future to allow greater access albeit to a recording. It is accessible on Youtube at: <http://youtu.be/KRTDqf0lyE0>

- Objective 6 – Publicity

In addition to the publicity generated through Dundee and Angus Education Departments the various shows and their links to the Tayside Space School received significant media coverage including:

Various local newspaper articles in Angus and Dundee.

Mention on national TV news coverage of Space school.

*Dr Alan Bruce from Abertay University said: "The Space School represents the culmination of months of activities for those primary pupils lucky enough to have been selected by their respective schools, while the Physics Fun in Space events have enabled even more pupils to enjoy a related experience.*

*"Such activities are so very important in stimulating young minds towards careers in science."*

Online TV coverage via Dundee Channel.

[Abertay Space School rockets around the County](#)

GLOW network access as above.

Youtube films and news links on University of Abertay website.

Mention in High School of Dundee newsletter.

Radio Tay and Wave 102.

In all of these media the generous funding from the Institute of Physics in Scotland is acknowledged and we believe it has been money well spent given the fun and enjoyment the show has brought to so many pupils.

Dr Alan Bruce, University of Abertay Dundee has been the project leader for the 'Physics fun in Space' project and can be contacted at [A.Bruce@Abertay.ac.uk](mailto:A.Bruce@Abertay.ac.uk) .



The 'Physics Fun in Space' Abertay team: Alan Bruce (centre) with undergraduates Ross Gray, and Emma Zajda.

Special thanks however are also due to Sarah Fletcher of the High School of Dundee for specialist advice and to the Contemporary Science technicians for the preparation of materials for each of the shows and to Mary Logue (Angus Education Department) and Morag Cooney (Dundee Education Department) for facilitating the schools visits.