

Einstein-First

Every child has the right to share our best
understanding of physical reality

Einsteinian Physics Education Research Collaboration (EPER)

ARC Centre of Excellence for Gravitational Wave Discovery, OzGrav

LIGO Scientific Collaboration Education and Public Outreach Working Group

14 August, 2019

Professional Development and upcoming mini-workshops

A one-day professional development program was run successfully at UWA on June 28, 2019 40 teachers from primary and secondary schools participated in this program. Teachers were introduced to all the resources and they gave feedback on how we can integrate Einsteinian physics concepts into an existing school curriculum. Based on their feedback, a report was prepared and circulated among all the participants. If you would like to read the report you can find it [here](#).

Ms Heather Valentine has very kindly agreed to convene 4 middle school after-school-hours mini workshops for the purpose of completing the process of identifying the optimal school years for different topics. These will be held as follow:

These mini-workshops will be held in room G16 in the physics building at 4.30 pm the first Friday of the month for the remainder of 2019. The first date is Friday 6th of September. If you are interested to attend these workshops, please contact Heather Valentine at hvalentine@stgeorges.wa.edu.au



On the professional day, teachers' explored Apollo 13 on a space-time simulator

Progress on Funding Agreement

Following the announcement of funding for the Einstein-First project by the Australian Research Council in March, 2019, we are required to complete a funding agreement contract. This is specified by the Australian Government. It must be signed by all 17 investigators and the 13 organisations involved. Unfortunately, the contract contains requirements about intellectual property and indemnity that have required legal discussions and long delays. It is now very close to completion. We cannot receive funds until the last institution has signed. We expect this to be very soon.

'Teaching Einsteinian Physics' Book Project

Last February our partners Ute Kraus and Corvin Zahn organised a brilliant seminar in Bad Honnef, Germany where many of the world's educators interested in teaching came together for one week. Magdalena Kersting and David Blair proposed creating a book on teaching Einsteinian physics in schools. This book will be specially for school teachers including those with a weak background in physics. It will have 25 chapters, written by expert authors from all over the world and published by ALLEN & UNWIN Publishers. The publisher is well-known and has been voted as "Publisher of the Year" thirteen times. David Treagust, David Blair, Jyoti Kaur and Rahul Choudhary are contributing chapters.

News and Conferences and Workshops

Jyoti Kaur was interviewed by Robyn William from the ABC science show. In the interview, she briefly talked about her experience in teaching Einsteinian physics to primary school students. If you would like to hear it, you can find it [here](#).

Magdalena Kersting, who has just returned to Oslo to complete her thesis, won the best presentation award at the recent GIREP physics education conference in Budapest.

At GIREP Magdalena organised a workshop on teaching Einsteinian Physics which was a big success. Following the workshop David Blair was asked to present the Einstein-First approach on quantum physics at a workshop on the European quantum science education initiative (see below).

David Blair and Ju Li attended the first international Gravitational Waves Education Workshop in Valencia where more than 60 physicists came together to exchange experience.

Magdalena was invited to present a talk in London on the EPER collaboration. It is full of lots of images from our project and events at Gingin. You can see it [here](#). Her talk gives a powerful case for the benefits of international collaboration in Education research.

The research team is really grateful to David Wood and Elaine Horne who have been making enormous contributions to our planning and outcomes. David analysed the results of the teachers workshop held on 28 June.

Quantum Education in Europe

Europe has recently funded a huge quantum flagship project that brings together science and industry. As part of the program there is a Quantum Science Education Initiative.

Here is a quote from one of their recent documents

The most urgent challenge consists in developing effective training and educational modules for learners in the areas that traditionally do not get in touch with quantum physics. An educational approach augmented by components conveying "quantum awareness" in the form of conceptual and intuitive understanding is needed.

...This paradigmatic change in teaching and learning of quantum physics merges decades of Physics Education Research and recently developed ICT-based approaches... visualizations, simulations... and games.

It is clear that the quantum side of Einsteinian physics is going to be a big focus in education, and the Einstein-First project is in the forefront of development.

New Space for the Einstein-First

The University of WA has agreed to refurbish and enlarge the space where we run Teacher PDs and workshops with school children. We are hoping this will be ready by the end of the year. Many of our activity resources are still set up in G16 in physics. This space is suitable for running one-day programs and can hold up to 30 people. If you are on UWA campus, come visit this room.



A photo of the exhibits in the Einsteinian physics outreach room.

Project Outline

Would you like to read an overall outline of our project? We have two documents available: a text summary that you can find [here](#), written by David Blair, and a Program Logic Document created by David Wood that you can find [here](#).

Research Activities

We have lots of exciting research results that we are writing up. Here are some highlights

- A paper describing the program we ran with Mel Maria Primary School Year 3 students that showed the enormous enthusiasm of the children to learn about photons and gravity.
- We are writing a paper based on our trialled collaborative program on integration of three resources developed independently by the EPER collaboration.
- A paper based on feedback received from the teachers who attended the professional development program on June 28, 2019 is in preparation. This paper will be published in the "The Australian Science Teachers" journal.
- A paper is in preparation based on a new approach for teaching quantum path integral to high school students.

Einstein-First Logo

The Einstein-First project is hoping to improve its existing logo. We would love to hear your ideas so if you think you or any of your students could help, please feel to contact us. An incentive, an appreciation award will be given to a student.

Future Events

Once the project commences, we will begin with a telecon of all the investigators, and we will be able to make appointments. Next year we want to start running the test programs in our partner schools. If you are interested in running these programs in your classrooms and have not send us an expression of interest, please feel free to contact us.

We will also run professional development programs from time to time. We are planning to start webinars once a month as it is difficult for teachers make commitments to come to UWA every month. Also, the teachers from the regional areas will benefit from these webinars. Prior to the webinar, you will be provided a lesson plan based on a specific topic which will be discussed in the webinar.

Interested in Joining the Project?

The Einstein-First team is looking for PhD students and Post-doctoral fellows. If you have an interest in the research and want to join the team as a researcher, please contact us. If you know of any others who might be interested, please pass on our details.