

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

12th November, 2019

Upcoming events

We are approaching the end of 2019 and it's time to look back at this year's events. First of all, we are really thankful to all the teachers who attended our workshops and gave us valuable feedback and comments on our resources or curriculum document. There are still two pending events and the details are as follows:

Last workshop of the year with primary school teachers

This year, we have had several successful workshops with primary and secondary school teachers. Outcomes of these workshops are given in brief below.

Our last workshop of the year with the primary school teachers is scheduled on 14 November from 4.00-6.00pm at UWA. In this workshop, team members and invited teachers from Pre-primary to Year 6 will discuss the outcomes of the mini-workshops and will come up with a final document regarding support for teachers involved in the project.

Einstein-First workshop at STAWA's Future Science

The Einstein-First team is presenting at the 2019 Future Science conference at Murdoch University on Friday 29 November. There will be a two-hour workshop where we briefly explain the project's background and rationale, introduce our resources, consider examples of the application of Einsteinian physics and provide an opportunity for participants to try the activities. Team members and secondary teachers involved in the research will co-present the session.

We encourage you to attend this workshop and discuss your experience with other teachers who are not yet familiar with this project.

Registration information is located at:

<https://www.cvent.com/Events/Register/RegNumConfirmation.aspx?e=e4d07f33-2a46-4e7f-a282-ead71f6ac369>

Outcomes of mini workshops with primary and secondary school teachers

Workshop with secondary school teachers

We had a number of workshops with secondary school teachers where we discussed various possibilities for integrating Einsteinian curriculum into the existing science curriculum. From these workshops, we have found that there are many instances in the curriculum where we could replace Newtonian physics with Einsteinian physics. Teachers gave positive responses to teaching every concept with a suitable activity. As per teachers' suggestions, our next step is to create lesson plans which will be easy to for teachers to follow, whether they have a science teacher training background or not; our team has started work on these. Next year, when we have all the lesson plans, we will schedule another workshop with teachers to get their feedback on the said lesson plans.

Workshop with primary school teachers

Similarly, we had several workshops with primary school teachers and received similar feedback to that given by secondary school teachers. The primary school teachers agreed that we should start introducing the vocabulary of Einsteinian physics from the kindergarten years; more detailed explanations can be given as the students progress. These teachers would also prefer to have every topic taught via a suitable activity. As mentioned above, the Einstein-First team will prepare lesson plans which will be discussed with the teachers next year.

First Zoom meeting with our national and international partners

The Einstein-First project has national (Melbourne and Canberra) and international (China, Korea, Germany, Norway, Glasgow and the United States) partners. On 24 October, we had our first two-hour zoom meeting with our national and international partners. We reported on our professional development workshops and discussed our plans for next year.



A screen shot of our first zoom meeting with the national and international partners. As seen in the second box of the zoom screen, all members from Western Australia sat together at UWA.

'Teaching Einsteinian Physics' Book Project

As mentioned in our last newsletter, the Einstein-First team and their international collaborators are working on a book project called "Teaching Einsteinian Physics" which will be published by well-known publisher ALLEN & UNWIN. Educators and researchers involved are working on their respective book chapters. Several chapters from the Einstein-First team are ready to be published. If you are interested in reading chapters and giving feedback, please let me know.

Research Activities

We have many exciting research results that have been submitted to reputable journals; others are still in progress. Here are some highlights:

- A paper based on the gender-related results from all the interventions has been submitted to the journal "Physics Education". Positive feedback has been received from the reviewers.
- A paper based on our trialled collaborative program on the integration of three resources developed independently by the EPER collaboration has been accepted by the journal "The Physics Educator". You will find it on our website once it is published.
- A paper describing the program we ran with Mel Maria Catholic Primary School Year 3 students, that showcased the enthusiasm of the children who learned about photons and gravity, is in progress.
- A paper based on a new approach for teaching quantum path integral to high school students is in preparation.

New members to this project

The Einstein-First team is very happy to introduce new members of the project team.

- Mr Shon Boubli: Shon has joined this project as a PhD student. He has done his Master's in teaching Einsteinian physics in Quebec.
- Mr Fabian Zuluaga: Fabian is a visiting student from a Columbian university. He joined our team in September and will be here until March. He has expertise in black holes and will help us develop lesson plans and activities to teach students about black holes.
- Ms Carolyn Maxwell: Carolyn has just completed her Master of Education at UWA. She has applied to join the project as a PhD student next year. Until then, she is working with the team as a research assistant.
- Ms Jyoti Kaur: Jyoti is on maternity leave until March, 2020. Carolyn is working in her place.
- Mr Massimo Mckie: Massimo is a Science Communications internship student who is helping us to improve the website and make more resources available to teachers and education researchers.
- Mrs Anna Ritzema: Anna is planning to join us for a Master's project and will be trialling Einstein-First material with indigenous children in Karratha.

Interested in Joining the Project?

If you are interested in running Einstein-First programs in your classrooms and have not sent us an expression of interest, please feel free to contact us.

The Einstein-First team is looking for PhD and Master students. 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.