



Canadian Association
of Physicists

Association canadienne
des physiciens et physiciennes

Contribution ID: 4095 Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

(G*) STEM-VIEW: A Graphical Interface for Physics Education

Monday, May 27, 2024 5:15 PM (15 minutes)

Purpose: For many students, a visual aid of the material presented in a physical curriculum is quintessential for a good understanding. In many cases, a simple diagram is sufficient and the student is able to intuit the impact of the various parameters.

In more complex topics, the role of each parameter can be difficult to perceive.

Method: This interface, completely built in Python, aims to present graphical representations of physical phenomena. Whether used by a student or an instructor, it is possible to modulate the parameters and see the impacts on the whole process.

For instance, topics currently available include refraction through multiple parallel interfaces, wavefunctions of basic quantum mechanical potentials, Riemann integrals, operations on complex numbers, attenuation law for photons in medical physics, 1D and 2D convolutions and their Fourier representations, and more.

The tool is freely available and presently available in both English and French.

Results: This tool was used in various class contexts, both as a tutor and an instructor. Students were able to use it by themselves and develop a better qualitative understanding of the physical processes. Instructors also have the possibility of creating precise diagrams quickly, which can alleviate the workload when preparing material.

The tool allows users to view complex phenomena without the need to resort to programming skills, which is necessary when discussing specific topics, such as Fourier transforms, convolutions, and filter. This permits the presentation of the material to group of students who are not yet able to work everything in detail, but might be interested in qualitative aspects. Although developed with the curriculum of physics in mind, it should be of interest to students in other neighbouring disciplines, such as engineering, computer sciences, and mathematics.

It was easily usable to create new material quickly.

Future Work: The whole project is still actively in development. In the short term, modules for classical mechanics and electromagnetism will be included.

Keyword-1

GUI

Keyword-2

Visual Tool

Keyword-3

Numerical Methods

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Session Classification: (DPE) M3-5 Novel Topics, Teaching Technology, and Labs | Nouveaux sujets, technologie d'enseignement et laboratoires (DEP)

Track Classification: Technical Sessions / Sessions techniques: Physics Education / Enseignement de la physique (DPE-DEP)