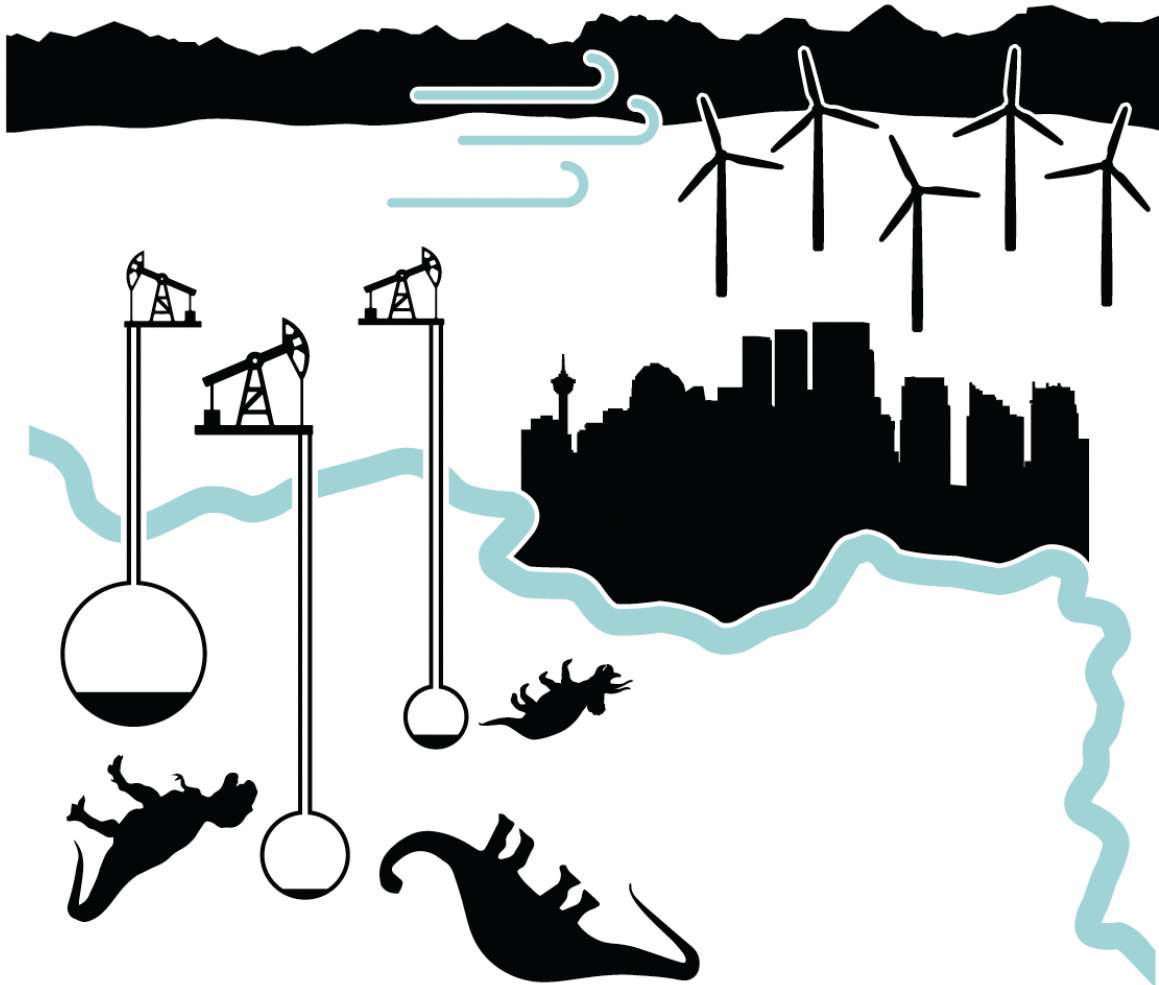
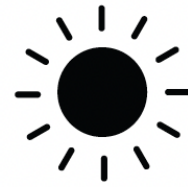


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ENERGIZING* *EDUCATION

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adopt a conception inspired by the critical scientific realism of the physicist and philosopher Michel Paty. His work leads to clarifications on the nature of the physical object and contributes to a philosophically critical view of some of the tenets of the Nature of Science, in particular: the subjectivity traits present in scientific activity; the role of imagination and creativity of scientific knowledge (Lederman et al, 2002; Lederman, 2007; McComas, 1998, 2020).

Key words: physics education, critical scientific realism, epistemology

Gods and Quarks: A Rhetorical Approach to Particle Physics

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Abstract We present some considerations on how studies concerning the *rhetoric of science* are helpful in order to teach particle physics to high school students. We propose an original approach on particle physics by analyzing how rhetoric affects the arguments of scientists and science enthusiasts. We aim to foster a critical, meaningful learning of this important field of modern physics. The analysis was carried out by selecting specific historical episodes concerning developments of particle physics, in order to verify how scientists and science enthusiasts (for example, science journalists) use rhetorical arguments to persuade and convince their audiences of the importance of their fields of research. Typical rhetorical elements we highlight in our studies are, for example: use of exaggerations and metaphors in order to make the physical concepts more easily understandable by the audience, and possible conceptual distortions done on purpose to persuade or convince the audience. On the process of persuading and convincing other scientists, politicians and general audiences on the importance of particle physics, scientists and enthusiasts often distort scientific ideas in order to be more appealing or easily understandable. Being aware of this aspect of how science works in a historical, political society may lead students to achieve a more critical way to think about science, distinguish between a scientific argument and a rhetorical argument and understand why scientific developments are trustworthy.

Keywords: rhetoric of science, history of science, science teaching

Exploring the advantages of integrating philosophy of physics for reforming physics education. Theoretical and practical solutions for critical thinking, instruction, textbooks, and nature of science learning.

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