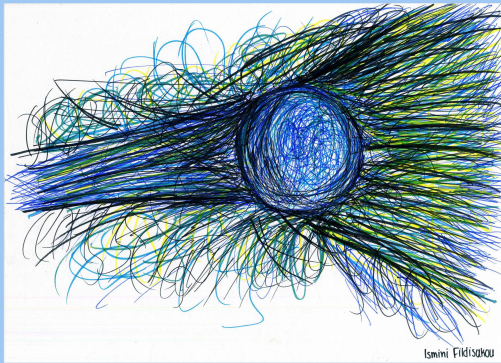


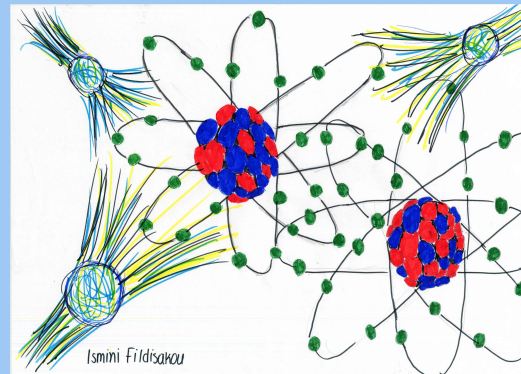
# "Ghost Particle"

Student's basic knowledge, concerning the way that the world is structured, begins, in a micro level, with basic concepts of molecules and atoms. Taking this as the starting point for our journey in the world of the subatomic particles, we aspire to introduce students to the most recent discoveries in the particle physics research – "The Ghost Particles, neutrinos". The selection of this challenging topic is not guided only by the recent '2015 Nobel prize award in physics for the discovery of neutrinos' oscillations' but also for the still unsolved mysteries of their identity and all the potential scientific breakthroughs that their exploration, by next generation scientists, may induce.

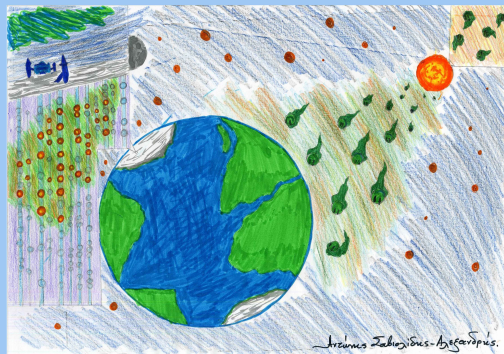
Students are given the opportunity to inquire and learn the history of particle physics from ancient history until present and acquire basic concepts and principles guiding the field of particle physics, beyond the school curriculum. They are also challenged to project the acquired knowledge and scientific concepts through dramatization activities by applying experiential modelisation techniques (Smyrniou, et al., 2016). They have had the opportunity to become part of the greatest scientific adventure in CERN and communicate with scientists through the ATLAS virtual visits. In addition, they are engaged in hands-on experimentation through interactive simulations and collaboratively perform realistic high energy physics data analysis, using the HYPATIA event display tool (Kourkoumelis & Vourakis, 2014) which uses data collected from the LHC running. Finally, students' understanding of the scientific concepts/theories under negotiation is projected through their engagement in creative artistic mediation such as drawings of subatomic particles featuring their principles and other artistic activities.



*A rough representation of a random neutrino's movement, function and behavior, running faster than light*



*Atoms and neutrinos travelling around space*



*The neutrinos, which also come from the sun's nuclear fusion with hydrogen, travel through space and pass through our planet. We can detect with the digital optical sensors in Antarctica.*



*On the point we can see the song of neutrinos. It is how they come to our world were they go, how they disappear, how we see them and what they can do.*



*In this drawing we see a neutron among other particles*

*This is from the implementation activity that took place in the 1st Exemplar Experimental High School of Athens, organised by the NKUA Team (Z. Smyrniou, E. Petropoulou, M. Sotiriou)*