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# Research oriented MSc course on solar eruptions

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Department of Physics, University of Helsinki, organized a five-credit-point Master-level course on "Solar Eruptions and Space Environment" in spring 2013. The course, attended by nine students, included twenty hours of introductory lectures on solar eruptive phenomena (focusing on energetic particle emissions) as well as experimental and theoretical methods to analyze them. In addition, the course contained ten hours of exercise sessions, where solutions on short calculation exercises were presented and discussed.

The main learning method on the course was, however, a coordinated scientific analysis of five solar eruptions observed by the STEREO spacecraft in 2010-2011. The students were grouped in four teams to study the solar eruptive events from four different view points: (1) Analysis of morphology and kinematics of coronal mass ejections, (2) analysis of EUV imaging observations of coronal wave-like transients, (3) solar and interplanetary magnetic field conditions during the eruptions, and (4) emission and transport modelling of near-relativistic electron events associated with the eruptions. Each group of students was assigned a scientist to oversee their work. The students reported weekly on their progress and gave a final presentation (of 30 minutes) in a seminar session at the end of the seven-week course. Grading of the course was based on the home exercises and final presentations. Students were also asked to give anonymous feedback on the course.

Learning results on the course were very encouraging, showing that research oriented courses with practical research exercises on specific topics give students deeper knowledge and more practical skills than traditional lectures and home exercises alone.