The Finnish Graduate School for Mathematics, Physics and Chemistry Education

The teachers who want to continue their studies towards a doctorship in physics education need help both from the department of physics and the department of teacher education. The foundation of the graduate school was based on the idea of joining the different teaching and research departments in order to create a multidisciplinary basis needed for teaching research and teacher education in mathematics and science, as this had earlier been occasional and depended on the individual person's own activities and efforts.

The graduate school organizes seminars as well as small group gatherings which are open to all the graduate students. It also maintains the www-pages and the email lists of the graduate students and the tutors for distribution of information and creation of contacts. It makes possible for some of the graduate students to study full-time, and finances their participation to the international conferences. At the end of the year 1999, in the graduate school there were 90 graduate students, of which 17 were studying full-time, seven member universities, and 57 tutors. Since its foundation in autumn 1995, five doctor's degrees and ten licenciate examinations have been performed.

The net address of the school is http://www.jyu.fi/tdk/kastdk/tutkijak-oulu.

The proceedings of Colloquium on Attainment in Physics at 16+ (Ed. R. Coughlan, University College Cork, Ireland) has been recently published. The Colloquium was organised by Ireland with the assistance of the European Union Socrates Programme. Detailed background papers on physics education at senior level in their countries were prepared by the nine participant countries and were reviewed by five international experts in the field of physics education. The proceedings include the experts' papers (prepared after the colloquium) on the items: curriculum issues, social issues, assessment, teacher training and an overview of issues arisen at the colloquium.

At the end of the rainbow – an understanding of nuclear matter

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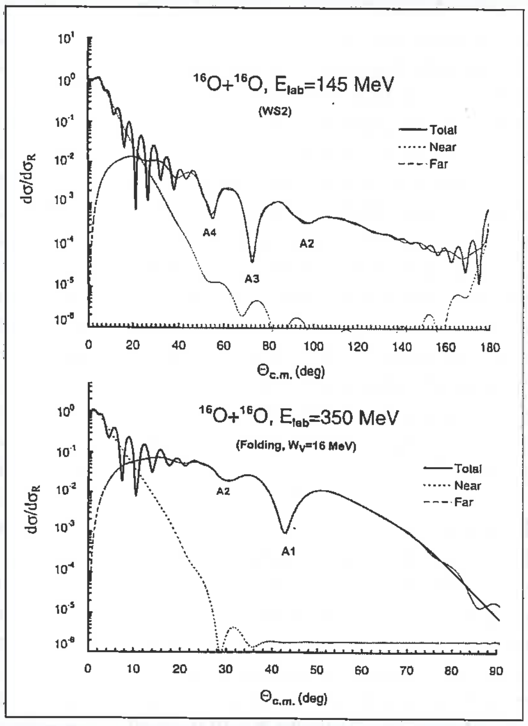
We resume and complete the discussion of rainbows from the last issue of europhysics news 31/2(2000), and we add missing refs. In both cases, in the refractive scattering of light and of particle waves rainbow scattering is observed. In the coloured figures on the cover and on page 5 of the cited issue the second light intensity in the left part of the figure is the secondary rainbow, which appears at a total deflection angle of 129°. The origin of the secondary rainbow is well explained in the small inserts on page 3 and 9, it originates from one more reflection in the water droplet, which gives a reversal of the ordering of colours (the corresponding deflection function is shown in Fig. B1.1). There is another remarkable detail in the colour photograph - the supernumerary rainbow. It can be identified in Fig.1(on page 5) by the continuation of stripes of violet and pink colour inside the first rainbow. These are the higher order structures of the Airy function. The Airy function has been shown in Fig. B1.2, it gives the correct description of the scattered intensity for rainbow scattering. Higher order Airy structures are difficult to observe in light scattering, if not a narrow band of wavelength is used, which will prevent the overlap of the coloured bands as it happens in fig.1. The higher order Airy structures are, however, well observed in nuclear scattering like in $^{16}O+^{16}O$. Inspecting Fig.2 we note that the primary rainbow located at energies of 480MeV and 350 MeV at angles of 30° and 50° respectively, moves out of the observable angular region (beyond 90°), as we go down to energies of 145 MeV and lower. At these energies the 2nd, 3rd and 4th order Airy structures are observed. This is shown in the present Figure (referred to as Fig.3 in the previous issue) with data at an energy of E = 124MeV. The calculations are done without consideration of the identity of the two ^{16}O-nuclei in order to show more clearly, 2nd and 3rd order Airy structures in the angular regions beyond 90°. These higher order Airy maxima/ minima are also discussed in refs. 1, 2, 3, 4. At the low energies (below 100MeV, ref. 4) the data are completely dominated by the 4th and higher order Airy structures. The figure in addition shows the decomposition into the "far" and "near" side contributions (left and right side from the central ray); the data show more structure than the calculation around 90° due to the Mott-interference of the spin zero ^{16}O-nuclei.



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