

representatives of other learned societies, including the American Chemical Society, the American Geological Institute and the American Society for Cell Biology. Not a single national scientific society representative endorsed the California science standards as written.

Given that the standards are now the guide to science education in California, the challenge is to implement them in such a way that teaching for understanding is not sacrificed for the sake of covering the content. Although we are less optimistic than LAPTAG's members in that regard, we wish them and all the other science teachers in California the best of luck in providing an excellent education for their students. As in the past, we shall continue to participate in those efforts.

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## Author, Reviewer Debate Freundlich's Role in Relativity

In an otherwise generous review appearing in your September 1998 issue (page 62), Jürgen Renn finds fault with my book on the Einstein Tower for supposedly focusing on "a single example" of Erwin Freundlich's efforts to provide empirical evidence for general relativity—namely, statistical investigations of gravitational redshift observations. Readers of this English-language edition (an expanded version of the German edition) will notice, however, that I devote a full chapter to Freundlich's work on light deflection, with emphasis on his 1929 expedition to Sumatra, when he obtained his first useful photographs of a solar eclipse. In this richly illustrated account (chapter 9), I discuss in detail the significance of Freundlich's use of a specially designed precision horizontal double camera, used in conjunction with the first independent determination of the scale factor. I also cover his well-founded critique of all previous light-deflection measurements, including the famous ones made by Arthur Eddington and Andrew Crommelin in 1919.

That Freundlich also served as a valuable discussion partner of Albert Einstein's is happily conceded. But I

do beg to differ with the reviewer about the way in which the "Berlin physics establishment" should be portrayed (see chapters 5, 10 and 11 of my book). Max Planck, Walther Nernst and Fritz Haber had put much into drawing Einstein to Berlin in 1914. That they initially received Einstein's efforts to generalize the theory of relativity with downright skepticism is a well-established fact (see, for example, Planck's public reply to Einstein's inaugural address at the Royal Prussian Academy of Sciences<sup>1</sup>). Nonetheless, Planck and other influential friends and colleagues of Einstein's in Berlin continued to support Freundlich's spearheading experimental investigations of the controversial theory at Einstein's explicit bidding, even after Freundlich lost his job at the Babelsberg Observatory (see the evidence presented on pages 35–41).

Up to 1920, few depended more on Einstein's "whims and woes" (to use Renn's phrase) than did Freundlich: "You have him in hand, so to speak," said Planck in a letter to Einstein dated 9 December 1917 (quoted on page 40). Ironically, it is a discovery by Giuseppe Castagnetti—namely, Einstein's letter to the ministerial official Hugo A. Krüss of 10 January 1918—that nicely documents how far Einstein went in interceding for Freundlich, whom he saw as his mouthpiece within the community of astronomers (see the quote on page 38 and also see note 20 on page 168—and I don't see how Renn can come to the conclusion that I have "cited but not used" this source). This supplements other evidence I introduce, such as the documents concerning Freundlich's engagement as the first—and, for a long time, the sole—staff scientist at the newly created Kaiser Wilhelm Institute of Physical Research.

## Reference

1. Proc. R. Prussian Acad. Sci., July 1914, p. 744.

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JÜRGEN RENN REPLIES: Klaus Hentschel's comments help to clarify the basic difference in our interpretations of Freundlich's role in the early history of general relativity. He portrays Freundlich's relation to Einstein as that of a patron and Einstein himself as an influential power player ably pulling the strings of the Berlin physics community. I see Freundlich as one of Einstein's early—and now mostly forgotten—companions whose

support was crucial for establishing general relativity, and Einstein himself as an outsider who depended on such companions with regard to both science and politics, even in the midst of his brilliant Berlin career. The historical documentation provides ample evidence for the Einstein-as-outsider view, which, however, probably due to the prevalence of the Einstein myth, tends to be neglected in the literature, and even in Hentschel's remarkable book.

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## Third Physicist Was Lost in Crash of Swissair Flight 111

The October 1998 issue of PHYSICS TODAY (page 76) commemorates the two colleagues—Per Spanne and Klaus Kinder-Geiger—who were killed in the 2 September crash of Flight 111 from New York to Geneva. Unfortunately, a third physicist also lost her life in that disaster. Her name was Natasa Cegar, and she was a young PhD candidate in our physics department here in Lausanne.

Natasa was returning from her first round of experiments at the State University of New York at Stony Brook and from a visit to Brookhaven National Laboratory's National Synchrotron Light Source. She was full of enthusiasm about having an opportunity to perform experiments at a prime international laboratory.

Born in Sarajevo in 1972 and an engineering physics graduate of the University of Belgrade, she had managed to overcome some most extraordinary adversities to begin building a promising career in research. Her research mainly concerned the magnetic and optical properties of fullerenes and related systems.

The history of physics includes many stories of gifted and dedicated young researchers making useful contributions at the beginning of their careers. Natasa was one of those individuals. It is tragic that both her life and career have ended so early and so abruptly. She will not be forgotten.

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