

glare, we can lower the overall levels of outdoor lighting, increase safety, and save energy.

Readers interested in learning more about outdoor lighting issues are invited to spend some time at <http://www.darksky.org>, the Web site of the International Dark-Sky Association.

Reference

1. Nancy Clanton, lighting specialist, presented initial results at the International Dark-Sky Association's annual meeting in Tucson, Arizona, in March 2002. Final results are expected to be published later this summer at <http://newbuildings.org/pier/> (click on "Outdoor Lighting").

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Another Look at Science in Spain Under Franco

Physicists working at the Universidad Autónoma de Madrid were unpleasantly surprised by the letter of our colleague, Julio Gonzalo, about the development of physics in Spain under the Franco regime (PHYSICS TODAY, March 2002, page 14). Although we respect each person's right to express his opinion (a highly risky activity in Franco's time!), we deeply disagree with Gonzalo's statements about physics and strongly reject his view of the last years of the dictator's regime.

Science in Spain did begin to develop in the last years of Francisco Franco's life, but it really progressed only after the establishment of a democratic regime. Credit for that development is due to the invaluable work of scientists who fought against a hostile environment and to the relative economic growth in the years preceding Franco's death.

Contrary to Gonzalo's opinion, Franco was ultimately responsible for a devastating war in which hundreds of thousands of people were killed, for a drastic stunting of Spain's economic and scientific growth, and for a 40-year period of political oppression.

In the last five years of Franco's life, several professors were banned from the physics department of our university because of their political opinions. Others, who came to Spain in the late 1960s and early 1970s after physicist Nicolas Cabrera was invited to return from exile, soon

had to leave the country because of political pressure and an atmosphere hostile to science. And what is much worse, university students and political prisoners were killed by the police or sentenced to death by the courts up until a few months before Franco's death.

Those activities were by no means signs of a "benign elder statesman," but hallmarks of one of the most notorious fascist dictators of the last century, a fact that should not be forgotten or disguised.

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Julio Gonzalo credits Francisco Franco with "a decisive victory over communism." Franco overthrew Spain's democratically elected government that was supported by republicans and socialists; at that time, there were very few communists in the country. His victory in the civil war was achieved with the crucial military help of Nazi Germany (remember Guernica?) and Fascist Italy, and cost 600 000 lives. Of Franco's opponents, 50 000 were executed after the war and 400 000 were exiled. But Gonzalo was right—although not in the way that he meant it—when he wrote that Franco's victory was "decisive for his country and for Western Europe." The evident reluctance of European democracies, primarily France and the United Kingdom, to confront that aggression and help Spain's legal government paved the way for Hitler's strategy and the catastrophe of World War II.

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We were very disappointed by the publication of Julio Gonzalo's letter, a mixture of half truths and distorted reality. Gonzalo wrote about communism, but he forgot to mention how Adolf Hitler and Benito Mussolini helped Francisco Franco, and how Spain suffered the dictator for 40 years without help from the "free world." He also mentioned Texaco's president and the Consejo Superior de Investigaciones Científicas (CSIC), but he forgot about the Junta para Ampliación de Estudios e Investigaciones Científicas (Study

Extension and Science Research Board), created in 1907. Santiago Ramón y Cajal, the 1906 Nobel laureate in medicine, was its president until his death in 1934. Within this group, the Instituto Nacional de Física y Química, (National Institute of Physics and Chemistry), established with grants from the Rockefeller Foundation, attained international recognition. In fact, the first third of the 20th century is known as the Silver Age of Spanish science.

The Junta para Ampliación de Estudios was dismantled by Franco's new regime in 1939. Gonzalo mentioned several Spanish scientists, but he forgot the names of those who suffered repression or were exiled by the regime and, in many cases, were replaced by incompetent ones whose only scientific value was to be Franco's henchmen. At least one of the people he cited, Julio Palacios, had been sent to interior exile after Spain's civil war. He died in 1970, in fact several years before Gonzalo returned to Spain.

Here are some figures to show how Franco's regime supported science: Spain's spending for R&D was 0.29% of GNP in 1967 and 0.3% in 1975, if we are to believe the figures given by Spain to the Organisation for Economic Co-operation and Development. We are sure that if science in Spain during Franco's regime had been carried out in the same way as it was in the rest of the world at the time, PHYSICS TODAY would have known about it, and would never have published such a letter.

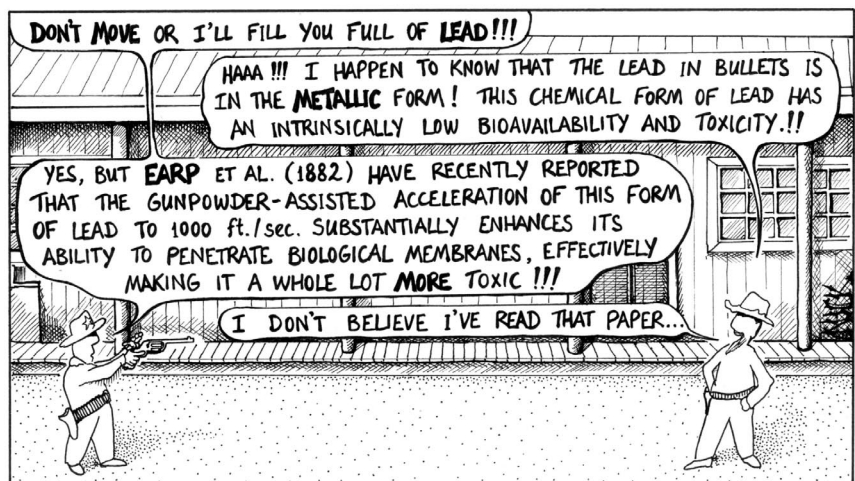
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Historical Note on the 'Flying Tigers'

My father is an Army Air Corps veteran, so I was very happy to see the terrific article, "A Physicist with the Air Force in World War II," by Alex E. S. Green, in the August 2001 issue of PHYSICS TODAY (page 40). During my perusal, I noticed an unintentionally misleading statement concerning the Flying Tigers. The article states that, in March 1945, Green's plane landed "at a field in Xian. This field was actually used by the Flying Tigers, American



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volunteer fighter pilots who had been fighting alongside the Nationalists since well before Pearl Harbor." The statement suggests that the Flying Tigers were still a volunteer group in 1945 and that they had been in combat before 7 December 1941, but both conclusions are incorrect.

The American Volunteer Group (AVG)¹ was created on 15 April 1941 by President Franklin Roosevelt in response to Colonel Claire L. Chennault's conclusion that Chinese Air Force pilots could not be trained in modern air-combat methods in time to prevent a Japanese thrust through western China and into Burma. The pilots and support personnel who joined the AVG arrived in Burma in September 1941. Due to the time that it took Chennault to train the pilots in his innovative combat techniques, the AVG did not actually enter into the fray until 20 December 1941, when they decimated a group of enemy bombers, preventing them from striking Kunming, China.

During the subsequent six months, the AVG established its legendary combat record, and received the "Flying Tigers" nickname from a grateful Chinese populace. The AVG, which was actually part of the Chinese Air Force, was dissolved on 4 July 1942 and replaced by the China Air Task Force (CATF), commanded by Chennault, under the control of the US Army's 10th Air Force. Just before the CATF's creation, many of the original AVG pilots left following a seniority dispute with the army.

On 9 March 1943, the CATF was dissolved, and the next day, the 14th

Air Force was formed, and flew until it was disbanded in December 1945. The CATF and the 14th Air Force were also referred to as the "Flying Tigers," indicative of their heritage. Thus, when Green's plane landed at Xian (also Sian or Hsian)^{1,2} in 1945, the airfield was not used by the famed AVG, but by their equally famous 14th Air Force successors.

My father, Lawrence C. Troha, who served with the 69th Depot Repair Squadron, 301st Air Depot Group, 14th Air Force, in Kunming, supplied me with the historical references.

References

1. Details mentioned are from W. G. Johnson, ed., *Chennault's Flying Tigers: 1941-1945*, vol. 1, 14th Air Force Association, Silver Bay, Minn. (1982), pp. 38-48 and map on back-cover flyleaf.
2. W. G. Johnson, D. Van Cleve, eds., *Chennault's Flying Tigers: 1941-1945*, vol. 2, 14th Air Force Association, Silver Bay, Minn. (1983), p. 116.

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A Critical Point

We read with great interest the illuminating review article by Barbara Goss Levi (PHYSICS TODAY, March 2002, page 18), in which she discusses the recent pioneering experiment on superfluid-Mott insulator transition in a system of ultracold atoms in an optical lattice. However, we disagree with the description of the data shown in figure 1, in particular that "the phase

transition occurs somewhere between (f) and (g)." The Garching-Munich group, which performed the experiment Levi describes, associates the quantum critical point with the case (e). We also disagree with the interpretation given by the Garching-Munich group of the interference peaks seen in their experiment. They associate the disappearance of Bragg reflection peaks with the phase transition of the Bose-Einstein condensate from a coherent, superfluid phase to a Mott insulating phase. We contend, however, that one cannot interpret the fading of Bragg peaks as a signature of a phase transition. The appearance of a Mott phase will be seen only in the fine structure of peaks.

The interference pattern of Bragg peaks results from the periodic lattice structure of the system and the phase coherence between lattice sites. As long as phase coherence exists on length scales of several lattice sites, one should see a clear picture of narrow interference peaks, with peak positions being in one-to-one correspondence with the reciprocal lattice space—that is, the Bragg peaks simply reflect the underlying periodic lattice. In a Mott phase, such a coherence is still present near the critical point (when insulating gaps are small) due to quantum hopping of loosely localized atoms to the neighboring sites; the coherence extends over a large correlation length. In this case, the interference signals only the essential quantum nature of the ground state.

The coherence disappears gradually as the tunneling strength grows weaker, as seen between (f) and (g), but this fading of Bragg peaks occurs beyond the critical point. For quantitative details and an extended discussion, see our precise numeric simulation of the experimental situation at <http://arXiv.org/abs/cond-mat/0202510>.

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Correction

May 2002, page 10—Michael Berry's correct Web address is http://www.phy.bris.ac.uk/staff/berry_mv.html. ■