

Remembering the 1987 Woodstock of Physics

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I was raised in the Town of Poughkeepsie, about 70 miles north of New York City, on the east bank of the Hudson River Valley. IBM dominated the economy and culture of the region with its manufacturing and development activities. My father, godfather-cousin and many of their friends were employed there, developing the first commercially successful mainframe computers. And I began working at the company during the last few months of my senior year in high school, commencing what was to become a 40-year career at IBM.

In the summer of 1969, at a farm near the village of Woodstock, about an hour's drive northwest of Poughkeepsie, there occurred an event that has defined the culture of my generation ever since. Unfortunately, I was not able to attend, as in 1965 IBM had transferred me to its research laboratory in San Jose, where throughout the 60s and 70s I carried out research on magnetoresistive compounds and organic conductors and superconductors.

I had often regretted missing out on this historic event in my old neighborhood, but then in March 1987, an equally monumental and spontaneous event arose at the APS Meeting held at the New York Hilton in downtown Manhattan. This "Woodstock" focused on physicists instead of musicians, featuring scientists as the new rock stars. The occasion was engendered by the discoveries of the family of copper oxide perovskite high temperature superconductors in 1986 and early 1987 at the IBM Rueschlikon Laboratory, the Universities of Houston and Alabama, and the IBM Almaden San Jose Research Laboratory.¹

The submission date for invited and contributed talks at APS March Meetings held in the 1980s were in the late fall. The December 1986 deadline for the 1987 session scheduled at the New York Hilton in March had already passed by the time the Bednorz-Mueller discovery became widely known and corroborating research began to appear overwhelmingly worldwide. The only abstract that made the deadline was from a collaboration led by Rick Greene of



The American Physical Society (APS) March Meeting of 1987 - The "Woodstock" of Physics.

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IBM Yorktown reporting specific heat measurements.²

Fortunately, Brian Maple of UC San Diego, on the APS March Meeting organizing committee for 1987, took the unprecedented and ambitious step of assembling an "off the program" all night session spanning Wednesday/Thursday that week. It became known as the "Woodstock of Physics," and there, some 50 plus speakers took five minutes each to "bloviate" from dusk to dawn. Ten years later, I wrote a commentary for the journal *Nature*, detailing the event and its excitement.³ Many of my observations therein remain relevant today.

Now, in a few weeks, it will be 30 years since our Woodstock. Many at the Hilton (mostly academics!) forecast the discovery of HTSC as engendering the "energy deliverance of mankind." The two years following our 1987 mid-Manhattan party were pure pandemonium...we were the heroes of the media. I was invited to deliver a number of talks and seminars on the physics of the discovery (not applications) in over 20 countries and three continents ranging from Belfast, Northern Ireland, to Havana, Cuba.⁴

In 1993, I retired from IBM to accept a position as Science Fellow at the Electric Power Research Institute with a

discretionary mission (4-5 M-USD/yr) to fund exploratory power applications of HTSC within the US Investor-Owned Utilities.⁵ The bottom line then and now: Despite many successful developments and demonstrations of HTSC wire technology and application to transmission cables, current limiters, rotating machinery, storage and levitated transportation, there remains no obvious "social or economic compelling need" for their deployment. At present, significant commercial utilization (I stress "commercial") of HTSC power technologies lies dormant all over the planet.

Is there hope? Possibly. The recently elected US administration has reopened consideration of the construction of oil/natural gas pipelines from the Dakotas and bordering Canadian Provinces to the Gulf Coast. There have been visionary proposals to pipe methane from eastern Poland all the way to Scotland, as well as from Siberia to western China. A paradigm for all can be found in the visionary and "long on-hold" Mackenzie Valley Pipeline⁶ down through the Northwest Territories.

As I sit typing this commentary, Elon Musk is proposing a nationwide network of traffic tunnels (just go Google "Elon Musk Tunnels"). All the above scenarios provide an opportunity for what I term exploitation

of “dual use of energy/transportation rights-of-way” for the co-transport of electricity employing either HTSC or HVDC cables, thus allaying a major cost for installing either technology.

In the meantime, the sole and consistently profitable enterprise utilizing the 1986 discoveries of Bednorz-Mueller and Chu-Wu remain the worldwide commercialization of Heidi Grant’s April 1987, 8th grade science magnetic levitation experiment.⁷

In closing, on this 30th anniversary of the Woodstock of Physics, I urge the cryogenics community worldwide to propose to their respective governments and energy agencies that they undertake and fund, not more costly demonstration projects, but “engineering economy studies” at much lower expense, to assess the economic and social benefits for humanity worldwide, enlisting governmental and private electrical and fossil fuel pipeline interest groups (e.g., EPRI, Gas Research Institute, etc.) on their team.

Should any readers of *Cold Facts* be

attending the 30th anniversary session at APS New Orleans to be held on Tuesday, March 14, in the local Convention Center⁸, please stop me afterwards and I’ll invite you to share a glass (or two) of cheap California chardonnay in one of the watering holes on Bourbon Street.

References

1. This commentary contains a number of anecdotal and informal references to the discovery period of high temperature superconductivity and beyond. Last year, in *Cold Facts* Vol. 32 No. 1, I reviewed the 1986 discovery period as one of intrigue both between and within participants and their respective institutions as reminiscent of the “double helix” period of identifying the molecular structure of DNA...and much more of that story remains to be told.

Other sources and background can be found by linking to the author’s website pages <http://www.w2agz.com>, and <http://w2agz.com/SuperWiki.htm#Superconductivity%20Today>, or by contacting the author via e-mail at w2agz@w2agz.com. Please keep in mind that this resource is offered as “fair use only,” with scholars and students as the target audience.

2. R. L. Greene, et al., submitted a presentation given 17 March 1987 at New APS March Meeting summarizing IBM research activity up to that time, one day

before the “Woodstock of Physics” 18 March session. Copy available at www.w2agz.com.

3. “Woodstock of Physics Revisited,” P. M. Grant, *Nature* 386, 115 (1997). Browse www.w2agz.com to download a copy.

4. In April 1987, IBM corporate and research communications designated Georg Bednorz, Alex Malozemoff and myself as the official press spokespersons for the IBM discovery. We were directed to only emphasize the science involved, and not possible IBM applications. However, we did carry out several internal (and unpublished) internal task forces focusing on magnetic recording and mainframe backpanel interconnections. Please email me (w2agz@w2agz.com) for further information.

5. As part of my “entrance exam” into EPRI, I researched and published a 21-page paper in the *IEEE Trans. Appl. Supercon.* 7, 112 (1997) issue, entitled “Superconductivity and Electric Power: Promises, Promises...Past, Present and Future.” Please go to <http://w2agz.com> to obtain a copy. Many of its conclusions still hold today in 2017.

6. Visit <http://www.mackenziegasproject.com/>.

7. P. Grant, “Do-It-Yourself Superconductors,” *New Scientist* 115, 36 (1987). Download available at www.w2agz.com or by emailing w2agz@w2agz.com.

8. Go to <http://meetings.aps.org/Meeting/MAR17/Session/E40>. Con Cuidado. Last minute changes are frequent at APS Meetings. ■

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