

quantum mechanics promised solutions to virtually all mysteries of atomic physics or molecular physics or nuclear physics or solid-state physics. It may be possible to say that physics of 1978 is as promising as physics of 1926, but certainly not fifteen times more promising. There has been a fourfold increase in the number of physicists since 1948, when the growth potentials in nuclear energy and semiconductors appeared to be unlimited.

Again, it may be possible that the horizon of physics in 1978 is as "unlimited" as 1948, but certainly not four times more "unlimited."

May I make an alternative proposal. Any professor with two or more unemployed (or vastly underemployed) disciples should refrain from accepting any more graduate students. Nobel laureates may work in any field of physics, but there is simply very little room for the less talented foreign student recruited from the underdeveloped countries to work on gauge field theories.

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11/28/78

OBAFGKMRNS

Concerning the letter by Owen Gingerich on page 15 in September; there is a time-tried mnemonic for the spectral star classes, which has been around a long time; I heard it first at Princeton around 1930. It goes:

Oh be a fine girl, kiss me right now—smack!

The fact that I have remembered this so long indicates that it is more memorable than the example given in the letter.

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9/25/78

Re Owen Gingerich's OBAFGKMRNS mnemonics, I have composed a few new ones:

1. For the Freshman: Observing Bright and Faint Galaxies Kills Many Rambunctious New Students

2. For the Senior: Only By Accident, Faded Giants Keep Mimicking Reddened Neutron Stars

3. For the Teacher: Observatories Boast A Few Graduate Knaves; Most Rascals Never Study

4. For the Administrator: Occasionally, Because A Fabulous Grant Keeps Multiplying, Research Never Stops

5. For the Physicist: One Befuddled Astronomer Finds Goofy K-Mesons Revealing Nuclear Structure

6. For the Radioastronomer: Oversize Broadband Antennas For Gigahertz Klystrons Modulate Radio Noise Sinu-soidally

7. For the Musician: Old Bruckner, Austria's Foremost Gentle Kapellmeister,

Manufactured Rather Noisy Symphonies

8. For the Businessman: Often, By A Financial Gimmick, Knotty Manipulations Revive Nosedived Stocks

9. For NASA: Overriding Bureaucratic Arguments, For Greater Knowledge Mankind Receives NASA Satellites

10. For NSF: Our Biggest Accelerators Fission Gravitational Kilobucks, Making Relativity Nasty Science

11. And finally, for the Astronomer (who views the Universe through an inverting telescope): Super Nova Remnants May Keep Going For Ages Beyond Ours

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The views expressed here are personal and do not necessarily reflect those of the US Government.

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9/27/78

THE AUTHOR REPLIES: My rather casual mention of the annual mnemonic contest in my Harvard Natural Sciences course evoked an unexpectedly wide response; I have now received prize-winning entries from astronomy classes across the country. It went without saying that our contest seeks replacements for the well-known and time-worn entry that is sometimes attributed to Henry Norris Russell, a memorable mnemonic that is nowadays often considered objectionally sexist.

I admire Feibelman's ingenious vocabulary, but memorable mnemonics also require a felicitous rhythm such as that found in "Oh bring another fully grown kangaroo, my recipe needs some." Among the winners in our contest have been: (1972) "On bad afternoons fermented grapes keep Mrs. Richard Nixon smiling," and (1973) "Out beyond Andromeda fiery gases kindle many red new stars."

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11/20/78

More on diode lasers

"Laser heterodyne spectroscopy measures planetary winds" in Search and Discovery (May, page 17), is an interesting introduction to an exciting new field. However, it contains statements about tunable diode lasers that may be subject to misinterpretation, and may lead to an undeservedly negative view of these important new devices. Michael Mumma's statement "... appropriate diode lasers have not been available commercially ..."

refers to a narrowly limited application in extra-terrestrial studies requiring a combination of exceptionally high single-mode power (about 1 milliwatt), long lifetime (about 1 year), and long wavelength operation, which is admittedly beyond the capabilities of present standard-model tunable diode lasers. PbSe lasers ($\lambda < 8.5$ microns) with operating characteristics superior in some respects to those used in Mumma's earlier work are available. Mumma is also quoted as saying that presently available tunable diode lasers can be tuned over a range of ± 0.5 microns; our standard Model SDL-3 lasers tune over a range of ± 1.25 microns around 10 microns and over wider ranges at longer wavelengths.

While the emphasis of the article was on extraterrestrial planetary atmospheres, the topics discussed include a range of other laser heterodyne activities. We were therefore surprised to note that two significant recent papers^{1,2} involving tunable diode laser heterodyne measurements were not cited. Margaret Frerking's study of stratospheric ozone with a ground-based heterodyne system¹ is generally recognized as an important advance in the field.

References

1. M. A. Frerking, D. J. Muehlner, Applied Optics 16, 526 (1977).
2. R. T. Ku, D. L. Spears, Optics Letters 1, 84 (1977).

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11/7/78

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