Standing on a stage near the border of France and Switzerland, the songwriter and keyboard player for Les Horribles Cernettes looks up at the sky and grimes. So much for the annual free Hardronic Music Festival, he thinks. Thousands of physicists, engineers, technicians, and their families sit in a grassy field, far from any shelter, at CERN, the European particle physics center. The crowd got in free; they won't hesitate to leave, Silvano de Gennaro thinks. He sighs, and his fingers touch the first note of the song "Big Bang" just as buckets of rain start to fall.

People start moving—but not to go home. Concertgoers pick up plastic chairs to shield their heads. Others alternate clapping to the beat and wiping rain out of their eyes.

Then water shorts out the lighting system. A bevy of upcoming special effects—heart-shaped balloons, bubbles, disco lights, smoke—vanish into the darkness. Disappointed, de Gennaro gets ready to pack up.

A beam of light streaks across the stage, focuses on a musician and stops, followed by another, and another. People are pointing flashlights retrieved from their cars.

"They were singing along. They called us back three times," recalls de Gennaro, who heads the laboratory's multi-media production department.

"They were all drenched, and they stayed anyway."

Their set finished, de Gennaro and his wife, Michele, change from the 1950s-style attire of the Les Horribles Cernettes, who sing doo-wop songs with physics themes, into the black and leather of a heavy-metal band.

Backed by a grinding guitar and pounding drum beat, a seductive Michele closes out the festival, whose 10-band lineup had the audience swaying to jazz, lindy-hopping to the Cernettes and, at the end, flailing wildly.

"They jumped on the stage with us and sang along," de Gennaro says.

"They head-banged."

With two decades of history behind it, the Hardronic Festival may be the biggest and best-known event in the high-energy physics music scene, but it's no anomaly.

Wherever physics is done, music rears its head—from a 20-year-old revolving-door rock band in Illinois to the sound of bamboo flutes in Japan, a jazz band in Germany, and a college physics instructor from California who spreads a message of science activism through a provocative nightclub act.
CERN's Les Horribles Cernettes

The Cernettes are known not just for their physics-flavored doo-wop, but also for posting the first photo on the Web. They also claim the first home page for a musical group.

From left: Anna MacNeil, Michele da Gennaro, and Vicky Cornass. Photo courtesy of Les Horribles Cernettes.
Beautiful connections
"I kept telling people it's not that different liking science or music," says Tokio Ohska, a former professional classical singer and semi-professional opera singer who is now a physicist at Japan's KEK laboratory. "In science you appreciate the beauty of the structure of nature. In music it is the same. You appreciate the beauty of the structure."

Music, he says, "kind of trains your mind so you can be creative. If you like physics and nothing but physics, I don't know if you can be creative."

Music and physics go back a long way. The Greeks used musical constructions to explain the orbits of planets. Albert Einstein played the violin. Werner Heisenberg played piano. Richard Feynman played bongos. Even today, college courses and popular science books such as Brian Greene's The Elegant Universe use musical analogies to explain string theory.

"It is amazing how much music has inspired physics," said George Gibson, a physics professor at the University of Connecticut who teaches a course on the physics of music. "It's kind of a one-way connection. Physicists are interested in music, but musicians aren't necessarily interested in physics"—although he says his course has persuaded some students to switch to physics majors.

Both music and science require self-discipline and the ability to work toward a distant goal, often by yourself. Like the math underlying physics, music consists of symbols making up a non-verbal language that uses patterns to forge meaning.

"We find order with a few gaps intriguing," Gibson says. "A gap in the Standard Model makes you want to find out what it is. Gaps in music draw you in because the pattern is not resolved until the song plays out. I assume an interest in music or physics is just playing on the same process in the brain."

Others take a less cerebral view of the connection, suggesting it is a byproduct of the long work hours and frequent travel that careers in physics often entail. People seek out music as a way to relax or to connect with researchers from other countries.

"It's really magic," de Gennaro says. "You all work together, and then you see your colleagues jumping around on the stage."

Dogs rock the prairie
Fermi National Accelerator Laboratory sits in the midst of an Illinois prairie that has been restored to its pre-settlement, early 1800s condition. The users' center and bar feel almost as old. Hand-me-down couches abandoned by graduate students push up against faded, wood-paneled walls. When the center fills with students and collaborators from the Collider Detector experiment at Fermilab, or CDF, it has the cozy feel of a family reunion at a small-town lodge. The feeling is heightened by the fact that the collaboration has its own rock band, Drug Sniffing Dogs.

"It is definitely fun to do something with your colleagues in a non-work context," says saxophone player Andy Hocker. "It is kind of a natural way to keep the camaraderie going."

The band's name was the result of a stalemate: after failing to find something everyone liked, members agreed that the name would be based on the next television image they saw. It was a show about police dogs.

The group plays for collaboration meetings, members' weddings, and block parties, and occasionally at the users' center for the whole lab. Dancing always ensues.

"A lot of people bring their children, so there are usually a half-dozen 2- to 5-year-olds swinging their arms in front of us," says Ben Kilminster, lead singer for the Dogs.

"We feed off the energy in the crowd."

In a world where jobs depend on yearly grants and researchers fly around the globe to work in international collaborations, holding a band of physicists together takes work. Band members rotate in and out. Founder Steve Hahn, the only constant, finds new members and offers his home for practices.
To ensure that enough players are available for each gig, the band has to build in redundancy. The Drug Sniffing Dogs roster includes five lead guitarists, two bass guitarists, two saxophonists, and a couple of horn players who can play several instruments.

In its 20 years of existence, the band has experimented with musical styles: to see what would get people on their feet. Feel-good, ageless rock classics work best. Cover tunes with physics lyrics drew interest, but not as much dancing, so they’ve been dropped from the repertoire.

At one lab Halloween concert, a saxophonist jerked his head at his band mates when he saw most of the crowd on its feet rocking to the song “Knock on Wood.”

“So we started running around in the crowd,” Hocker says. “Someone grabbed one of the horn players and that just sort of spontaneously morphed into a conga line.”

Building a music scene
Each laboratory has a unique musical culture, a blend of local styles, on-site amenities, and staff tastes.

At KEK, for instance, Ohska tried to get a band together, but people were too busy. So he created a concert series that brings in outside musicians,
as well as an annual art festival that mostly features solo or duet performances by lab personnel. There, the music takes on a soft and lyrical quality as crowds gather to hear co-workers on bamboo flutes and violins.

CERN has more success building bands. The lab has a practice room and a music club with 120 members. But it took nearly 30 years to grow such a substantial musical base. For the first Hardronic Festival in 1989, de Gennaro could barely scrounge up a dozen musicians to forge last-minute acts to fill the stage. Today the festival has more would-be participants than it can accommodate, and the lab hosts smaller concerts every two or three months.

“The Hardronic Festival was really the spark that started the fire,” de Gennaro says. “There was a massive number of people who came around and joined the music club after that.”

By providing mixing boards, microphones, and other equipment for a small fee, the music club has encouraged the creation of bands like the Canettes, whose name is both a play on Cernettes and a nod to the half-liter beer orders popular in Geneva.

“I said, ‘OK. Let’s try this out,’ and it was fun,” says Steve Goldfarb, who along with fellow ATLAS experiment member Connie Potter is a lead singer for the blues band. Three more CERN employees and four local residents complete the roster.

Although vacation schedules make it hard for the blues band to play the Hardronic Festival, it appears regularly at local clubs, drawing a fan base of several hundred Americans and Britons. Some members wear black suits, sunglasses, and hats reminiscent of the American movie classic The Blues Brothers.

During a recent gig at the 7 Arts pub, harmonicas and saxophones moaned as Goldfarb jumped around and fell to his knees, crooning to the standing-room-only crowd. “Some real blues, man!” yelled a Florida man, Paul Vega, from the audience. “Finally, some blues in Geneva.”

Blue jazz

At Germany’s Deutsches Elektronen-Synchrotron Laboratory, or DESY, the music scene grew more slowly. The lab now has a choir, a classical band, and an orchestra. Individual staffers practice banjos, pianos and trumpets for solo shows. Rock bands are rare, but a jazz band with a soulful side has found a niche.

Blue Wine took its name from the bottles consumed during practice to loosen lips and fingers, and—depending on which band member you ask—the German term for “drunk” or a term for blues-inflected scales and notes. The 10-member band plays occasional gigs before a crowd of about 150 in a nearby small town. It also performs three or four times a year at the lab’s restaurant, for holiday parties and at employee birthday parties.

Core band members come from the technical, computer, administrative, and research sections of the lab. One non-lab musician rounds out the group, which ranges in age from 32 to 67, and visiting researchers sit in. “The band is very open,” says trumpet player Manfred Rüter.
As at other labs, weekly practices must compete with work and family commitments. "Sometimes we have more bottles of red wine than musicians," says saxophone player Christian Mrotzek. That's OK, he says, because the night is as much about socializing and relaxing as making music.

Rütter, who initiated the group, took to music much later than his band mates did. As a young man he was captivated by the free-spirited, high-energy vibe of jazz clubs and wanted to take up the trumpet. He just never found the time until a DESY colleague walked into his office talking about music. Rütter was 50 at the time. He shared his desire to play, the colleague said he had extra trumpets at home, and for the next nine years Rütter practiced and played off and on with friends before launching Blue Wine with fellow lab employees. The band has been together five years.

Mrotzek, meanwhile, had been playing saxophone. He didn't want to bother anyone, so he practiced his instrument in a guest room below the lab's cantina. That's where guitar player Bernd Reime found him. As Mrotzek recalls it, Reime asked, "What are you doing here? There is a band nearby. You have to come play."

Later, Reime saw Felix Beckmann walking through the lab with a trombone case. The men started bumping into each other and into other music lovers and talking about songs. Blue Wine was solidifying.

Drummer Peter Gasiorek had retired, but came back at age 67 to join the band because it gave him a connection to the lab and his old colleagues.

Judging from audience reactions at DESY and other labs, they seem to enjoy those connections, too.

**Physics cabaret**

Some bands use music to enrich their lives; others use it as a way to show non-scientists their world.

The Cernettes sing about physics concepts in songs like "Every Proton of You" or "Big Bang." They also sang "Surfing on the Web" in 1992, at a time when the World Wide Web, created at CERN to allow physicists to share data, was a mystery to most people. The first photo on the Web was of the Cernettes, who also claim to have created the first homepage for a musical act.

Lynda Williams also sings about physics, but with a political message. As the Physics Chanteuse, she croons about the 1980s political downfall of the Superconducting Super Collider, which was abandoned midway through construction in Texas. In "Hi Tech Girl," set to the tune of Madonna's "Material Girl," her backdrop is a photo montage of 300 women scientists.

Women have not always found her act endearing, though. She dresses in evening gowns or slinky cocktail dresses with go-go boots, turning her act into a cabaret. Some say the sex appeal in the show demeans the science, but Williams, who teaches physics and astronomy at Santa Rosa Junior College and formerly at San Francisco State University, says it does just the opposite.

"I can prove science is super-sexy," she says. "I don't mean pornographic; I mean titillating. It's cool. It's slick. String theory and high-energy particle physics are as cutting edge as there is. People are really, really interested in smart, sassy, sexy science and that is what I do."

The American Institute of Physics commissioned her to write a song for Valentine's Day. The result was "Love Boson," about an unmeasurable particle that mediates the force of love. Physicists cheer the show, she says, but it's the engineers, political junkies, and science fans who really go wild. And winning over those groups helps scientists make the case for cutting-edge research projects to the general public.

She says she hopes her songs encourage people to spread the message that understanding science is power.

"If I am going to talk about global warming or carbon dating, before I can make a political comment people have to understand the science," Williams says. "They are always surprised. They say, 'I had no idea this is what science is about.'"
A Physics Songbag

The editors of PHYSICS TODAY take you on a shuffle and a dip into the long tradition of giving a lyrical voice to science. This grab bag of songs concludes with a lyric-writing contest.

Perhaps Pythagoras was the first to meld music and science. Perhaps not. But one can easily imagine that Aristophanes, the great comic playwright, might have written a passable Pythagorean parody for any classical Greek chorus to stand and deliver. Today, many are the undergraduate and graduate students who try their hand at the time-honored enterprise of devising new lyrics to well-known melodies. Fewer are those who devise new melodies as well. And not just students take up the challenge.

We are grateful to several individuals for their help. Walter Smith, whose website (http://www.physicsongs.org) is a treasure trove, provided much kind assistance. Tom Lehrer, Laura Greene, Lynda Williams, and Michael Meldelso graciously shared some of their original material with us.

On these pages, we present a mixed bag of songs that span nearly 100 years. Making the selections was difficult given the plethora of material. But whether they were written to entertain, to teach, to vent, to honor, or just to have fun, we hope you will enjoy our choices.

Music icons

Next to some of the songs that follow, you will also see large icons signaling that recordings are available on our website, https://www.physicstoday.org. Musical notes indicate that a sound file of the musical accompaniment is online, and for songs marked with a singer icon, you can hear a full-length performance. On page 61, we offer you an original melody, and challenge you to write lyrics for it. The best submission(s) received by 15 October 2005 will be printed in the December 2005 issue of PHYSICS TODAY.

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**hv (aitch noo)**

1. All black-body radiations,
   All the spectrum variations,
   All atomic oscillations
   Vary as "hv."

2. Ultraviolet vibrations,
   X- and gamma-ray pulsations,
   Ordinary light sensations
   All obey "hv."

Chorus:

Here's the right relation
Governs radiation,
Here's the new,
And only true,
Electrodynamic equation;
Never mind your d/dt²,
V times e or half mν²

(If you watch the factor c²)
\( E = \text{hv.} \)

3. Even in matters calorific, 
   Such things as the heat specific 
   Yield to treatment scientific 
   If you use "hv."

4. In all questions energetic 
   Whether static or kinetic, 
   Or electric, or magnetic, 
   You must use "hv."

5. There would be a mighty clearance, 
   We should all be Planck's adherents 
   Were it not that interference 
   Still defies "hv."

Chorus

---

Around 1920, not so long after Max Planck proposed his eponymous constant, this song emerged at Cambridge University in the UK. The rival quantum and wave theories seemed inconsistent, yet both were necessary. As Sir William Bragg said, "We teach the wave theory on Mondays, Wednesdays, and Fridays and the quantum theory on Tuesdays, Thursdays, and Saturdays." The author of this song is Gilbert Stead, a lecturer at the Cavendish Laboratory, who also wrote the textbook Elementary Physics in 1924 (published in updated editions for 30 years). The song was among those sung by Cavendish students and faculty after their annual dinners. The tune is "The Men of Harlech."
HOW NICE TO BE A PHYSICIST
by Arthur Roberts

How nice to be a physicist in 1947,
To hold finance in less esteem than Molotov does Haven,
To shun the importuning men with treasure who would lend it,
To think of money only when you wonder how to spend it,

Oh, Research is long,
And time is short
Fill the shelves with new equipment,
Order it by carload shipment,
Never give
A second thought
You can have whatever can be bought.

How nice to be a physicist in this our year of grace,
To see the scornful world at last admit your rightful place,
To see the senators defer to every wise pronouncement
To fascinate the women's club, and star at each commencement,

Oh, Research is long,
And time is short
Drink your fill of adoration,
Glory in the new sensation,
Never give
A second thought
Sinatra holds a place that many sought.

But have you sought a physicist and place for him to dwell,
And searched the town in vain to find a vacant dungeon cell
Or tried to teach a thousand students who can't do a sum
The girls who'd like to be Greer Garson finding radium?

Oh, Research is long,
And time is short
Toward the thesis drive the student,
Physics was his choice imprudent,
Never give
A second thought
Brains are still a thing that can't be bought.

Oh did you write a book on fission which you tried to sell?
Or wonder while you lectured what you could or couldn't tell?
Or try to get declassified some nuclear equations,
Or wonder if the work you do was done at secret stations?

Oh, Research is long,
And time is short
If you find a fact essential
Classify it confidential
Never give
A second thought
The FBI's approval must be sought.

How nice to be a physicist in 1947,
How nice ...
How long do you think it would take to learn something about, uh, butterflies?

Physics professor Arthur Roberts of the State University of Iowa (now the University of Iowa) was commissioned by Mariette Kuper to write "How Nice to Be a Physicist" for the MIT Radiation Laboratory reunion party held during the Washington, D.C., meeting of the American Physical Society in May 1947. Roberts's songs were well known in the physics world from the late 1940s to the early 1960s. He passed away last year (see PHYSICS TODAY, January 2005, page 68). A 1947 performance of this song is available on our website.

THE STEADY STATE IS OUT OF DATE
George Gamow (to the tune "O Tannenbaum")

AUIDENCE: YOUNG ADULT - ADULT

G C D G 'Your years of toil,' said Ryle to Hoyle, 'are wasted years, believe me.'
G C D G The steady state is out of date; Unless my eyes deceive me.
G C D G My telescope has dashed your hope; Your tenets are refuted.
G C D G Let me be terse: Our universe Grows daily more dilute!

Said Hoyle, 'You quote Lemaitre, I note. And Gamow. Well forget them!
That errant gang And their Big Bang - - Why aid them and abet them?
You see, my friend. It has no end And there was no beginning.
As Bond, Gold, and I will hold Until our hair is thinning!'

'Not so!' cried Ryle With rising bile And strainning at the tether:
'Far galaxies Are, as one sees, More tightly packet together!'
'You make me boil!' Exploded Hoyle. His statement rearranging:
'New matter's born Each night and morn, The picture is unchanging!'

'Come off it, Hoyle! I aim to foil you yet' (The fun commences)
'And in a while.' Continued Ryle. 'I'll bring you to your senses!' [stop at 1" double bar]

This undated ditty was written by George Gamow (1904-1968), pioneer of big-bang cosmology. The protagonists, British astronomers Martin Ryle (1918-1984) and Fred Hoyle (1915-2001), were often publicly at odds over their respective visions of the cosmos. Hoyle pioneered the steady-state theory.
Many of Tom Lehrer's songs, such as "The Elements" or "The Vatican Rag," have acquired legendary status (at least for those of us of a certain age). Lehrer wrote "The Physical Revue (a music drama in one scene)" and staged it in January 1951 at Harvard University, where he was then a graduate student in mathematics. According to the program, the scene was "The last class of a mythical course, Physics 11a. (There will be a three-year intermission at the end of Scene 1)," and these songs were included. Most if not all of the songs from there and then have never been commercially available.

A LITER AND A GRAM
(Music: "A Bushel and a Peck" by Frank Loesser)

I love you a liter and a gram,
A liter and a gram, and it's crazy that I am,
A meter and a yard and a newton and a watt,
A newton and a watt, and I wanna know a lot
About you, about you
(A meter and a liter,
nothing could be sweeter.)
'Cause I love you a liter and a gram,
And it's crazy that I am for you.

I love you a poundal and a dyne,
A poundal and a dyne, and I wanna make you mine,
A foot-pound and an erg and a joule and a calorie
A joule and a calorie, and I wanna spend my salary
On you, on you
(Centigades and Fahrenheit,
You lift me up to darin' heights.)
'Cause I love you a poundal and a dyne,
And I wanna make you mine, I do.

The Professor's Song
(Music: A. S. Sullivan — "If You Give Me Your Attention," from Princess Ida)

If you give me your attention, I will tell you what I am.
I'm a genius and a physicist (and something of a ham).
I have tried for numerous degrees, in fact, I've one of each:

Of course, that makes me eminently qualified to teach;
I understand the subject matter thoroughly, it's true,
And I can't see why it isn't all as obvious to you.

My lectures all are masterpieces, excellently planned,
Yet everybody tells me that I'm hard to understand,
And I can't think why

My diagrams are models of true art, you must agree,
And my handwriting is famous for its legibility;
When I write "gravitation," say, or any other word,
For anyone to say he cannot read it is absurd.

My demonstrations all get more remarkable every year,
Though, frankly, what they go to prove is sometimes less
And all my explanations are quite lucid, I am sure,
Yet everybody tells me that my lectures are obscure.
And I can't think why

Consider, for example, oscillation of a spring:
The force that acts upon it is a very simple thing.
It's $kx^2$, or $kx^2$ — no, just $kx$ I'll bet,
The sign in front is plus (or is it minus? . . . I forgot).
Well, anyway, there is a force, of that there is no doubt.
All these problems are quite trivial, if you only think them out.
Yet people tell me: "I have memorized the whole term through,
Everything you've told us, but the problems I can't do."
And I can't think why

Data Dips and Peaks (with apologies to Ella Fitzgerald)

Heaven, I'm in heaven
And my heart beats so slow that I can hardly speak,
'Cause I finally found the funding that I seek.
Now I'm measuring those data dips and peaks.

Heaven, I'm in heaven
And the cares that hung around me 50 weeks
Finally vanished like a gambler's lucky streak
With acquiring all those data dips and peaks.

Now I love to go to meetings, And to hear or give a speech
But I don't enjoy them half as much
As data dips and peaks.

I love to read and write a paper. And a physics course to teach
As data dips and peaks.

Oh points on my screen
I want to analyze you
Just one effect new
Will carry me through to

Heaven, I'm in heaven
And my heart beats so slow that I can hardly speak,
'Cause I finally found the funding that I seek.
Now I'm measuring those data dips and peaks.

Laura Greene, professor of physics at the University of Illinois at Urbana-Champaign, wrote this song in 2001. The melody is that of "Cheek to Cheek." Says Greene, "Maybe the apologies should have been to Irving Berlin, who wrote the original song, but I copied the words and style from the Ella Fitzgerald / Louis Armstrong rendition, trying to follow Ella's phrasing as much as possible. I am also a great fan of Ella in general."
RELATIVITY
(Music: “Personality” by James van Heusen)

When Isaac Newton wrote
The laws that we all quote,
It’s now extremely apparent that he
Neglected to consider — Relativity.
What focused our attention
On the fourth dimension?

(We’d been doing so well with just three.)
’Twas Mister Einstein’s brainchild — Relativity.
And who would think
And who’d forecast
That bodies shrink
When they go fast?
It makes old Isaac’s theory
Look weary.
And so if you are near
When atom bombs appear,
And you’re reduced to a pile of debris,
You’ll know it’s largely due to — Relativity.

DON’T MAJOR IN PHYSICS
(Music: “The Trouble with Women” by Kurt Weill)

(1st student)
Oh, I once loved a sweet Physics student,
The loveliest girl one could find,
But I tried to get close and I failed,
For she said that she wasn’t “that kind.”

(2nd student)
Oh, I too loved a young Physics major,
She was pretty and healthy and pure,
But I wouldn’t take one now on a wager,
For they all are like her, I am sure.

(Chorus)
She didn’t like couches or hammocks
Or walks in the moonlight for two.
All she thought of was thermodynamics,
So what, tell me what, could I do?

(3rd student)
Now I have the opposite status:
I like physics and my girl does not.
I tried showing her my apparatus,
But a blank smile was all that I got.

(Chorus)
She asked me why I was in Physics,
And advised me to transfer to Ec,
And whenever I tried to talk Physics,
All she wanted to do was to neck

WHEN YOU’RE IN k-SPACE
(Lyrics by Dr. James D. Livingston
Tune: “Makin’ Whoopee,” by Walter Donaldson)

The bound’ries of the Brillouin zone
Just represent a law you’ve known
The satisfaction of Bragg diffraction
When you’re in k-space

Those bound’ries on the k-space maps
Are where you’ll find energy gaps
That’s an attraction of the abstraction
When you’re in k-space

And there’s the Fermi surface
Contour of energy
Things happen when that surface
Reaches the boundary

Dimensions in momentum space
Are inverse of the normal place
Just keepin’ busy can make you dizzy
When you’re in k-space

Jim Livingston had a long career as a research physicist and, since his retirement from General Electric Co., has been a senior lecturer in the department of materials science and engineering at MIT. He wrote these lyrics around 1997, as one in a series of songs for each chapter of the textbook he was teaching from. The melody hails from the 1928 Broadway musical Whoopee!
Solid State of Mind
A parody of Billy Joel’s “New York State of Mind”
written and performed by Lynda Williams

Some folks like astronomy and study galaxies in the local group.
Some like quantum gravity, pulling super strings from the
cosmic soup.
But I’m pointing my laser, at an earthly crystalline.
I’m in a Solid State of Mind.

I’ve heard all the theories on the Higgs boson and
supersymmetry.
Been around the cyclotrons and down the beam lines of high
energy.
But I can build what I’m needing — I don’t need to wait for time.
I’m in a Solid State of Mind.

I really dig crystallography and the symmetries of lattices
and point groups.
Is it orthorhombic, hexagonal, or face-centered cube?
X-ray diffraction is a great way to spend some time.
I’m in a Solid State of Mind.

It is so easy to get work today.
If Solid State is the physics you do.
Hard drives, cell phones, computers, hearing aids.
The Solid State — it pays.

Semiconductors have changed the way that we live today.
Junction transistors gave birth to our computer age.
Electronic switching — getting faster all the time.
I’m in a Solid State of Mind.

It is so easy to get work today.
If Solid State is the physics you do.
MOSFETS, ICs, LEDs and wafer substrates
The Solid State is here to stay.

Superconductivity at High $T_c$ is super cool
Superfluidity of He-3 is super smooth
So many super mysteries
We'll solve them one phase at a time.
I'm in a Solid State of Mind.

I'm building a quantum dot laser out of indium arsenide.
I'm in a Solid, or Amorphous, State of Mind.

© 2005 Lynda Williams

The World Year of Physics, which celebrates the centennial of
Einstein's miracle year of 1905, is now half over. This
song was written to help celebrate the WYP by Marian
McKenzie and her husband, Walter Smith, a physics profes-
sor at Haverford College in Haverford, Pennsylvania. Smith
also hosts an extensive collection of physics-related songs

Divine Einstein!

by Marian McKenzie & Walter Smith 3-16-05

(To the tune of "I'm Lookin' Over a Four-leaf Clover")

G     G     G     G     
No-one's as de-e-vine as Albert Einstein  
A     A     A     A     
Not Maxwell, Curie, or Bohr!  
D     D    G     E    
He explained the photo-electric effect,  
A     A     A     A     
And launched quantum physics with his intellect!  
G     G     G     G     
His fame went glo-bell, he won the Nobel --  
A     A     A     A     
He should have been given four!  
A     A     D    G    
No-one's as de-e-vine as Albert Einstein,  
A     D    G     G     
Professor with brains galore!  
G     G     G     G     
No-one could outshine Professor Einstein --  
A     A     A     A     
Egal, could that guy derive!  
D     D    G     E    
He gave us special relativity,  
A     A     A     A     
That's always made him a hero to me!  
G     G     G     G     
Brownian motion, my true devotion,  
A     A     A     A     
He mastered back in aught-five!  
A     A     A    D    
No-one's as de-e-vine as Albert Einstein,  
A     D    G     G     
Professor in overdrive!  

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Lynda Williams teaches physics at Santa Rosa Junior
College in Santa Rosa, California. As “The Physics
Chanteuse,” she has performed at many scientific meetings
and other venues for the past eight years. The composition
presented here and on our website is included in her new
CD collection, Parody Violation, available through
EL BAILE DE LOS ENTRALAZADOS
("THE DANCE OF ENTANGLEMENT")

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