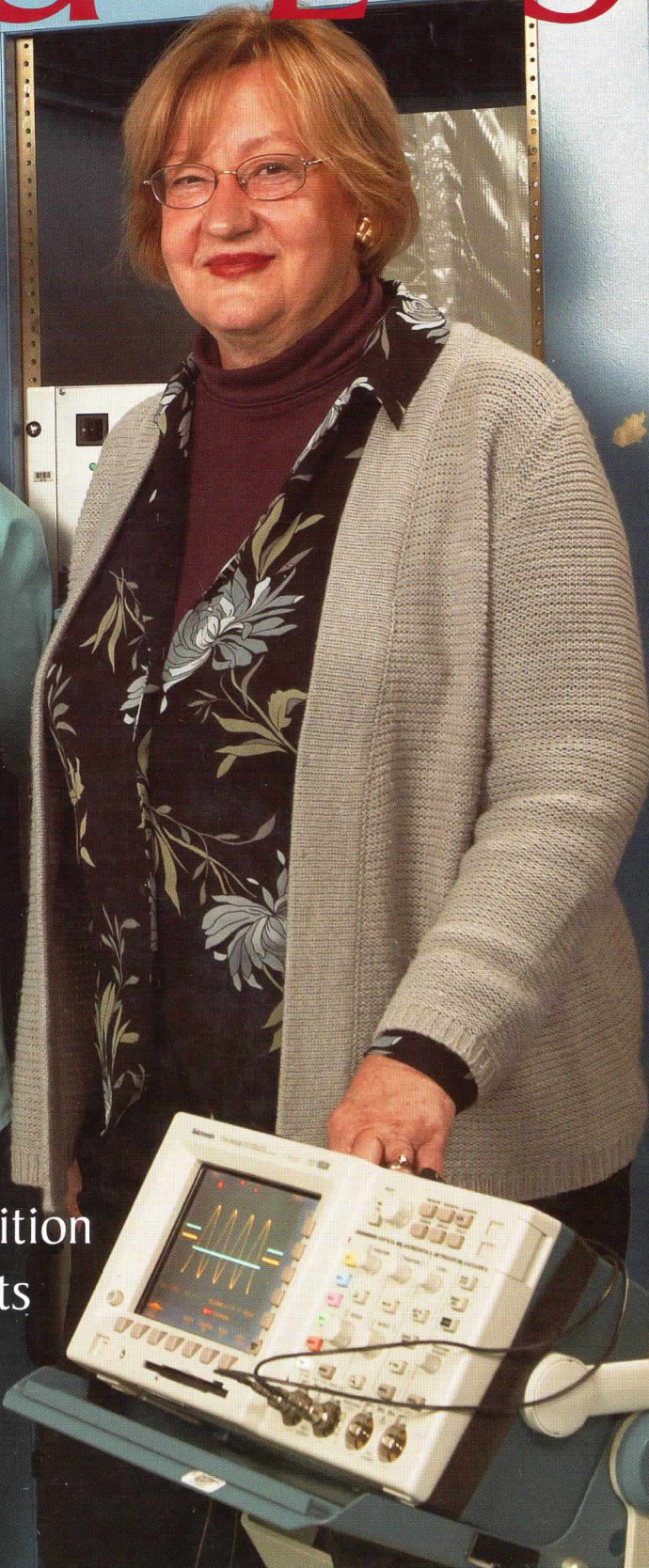
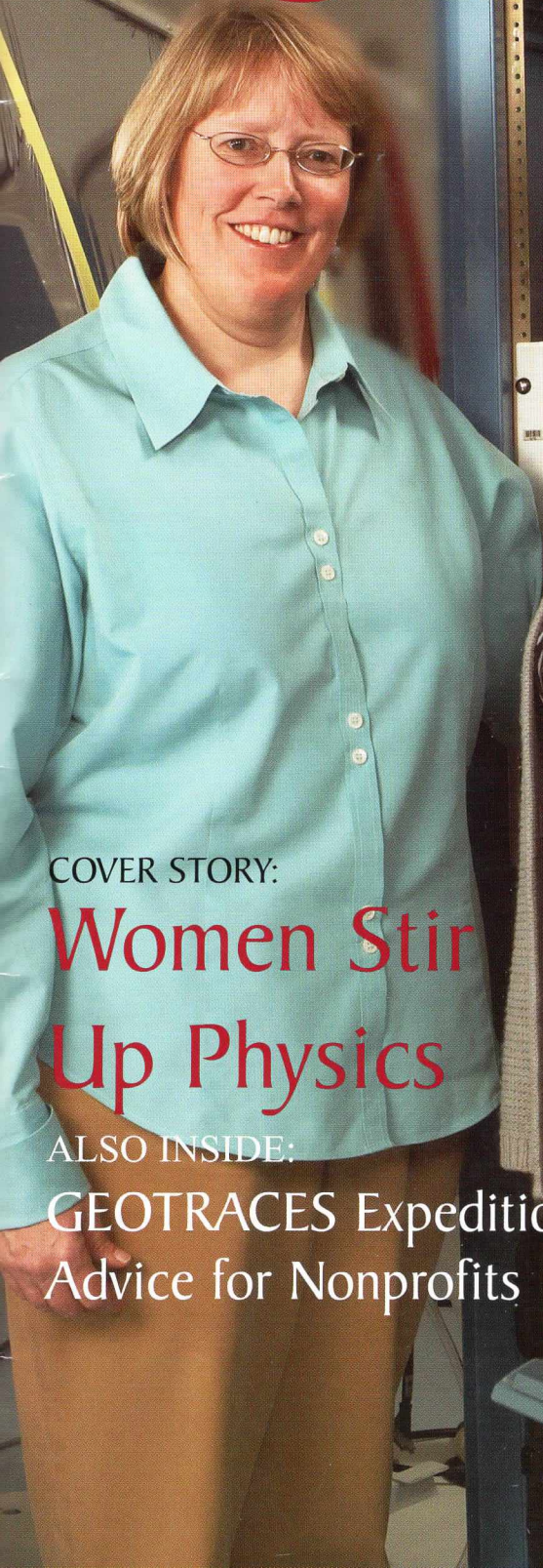


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# QUEST



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## Women Stir Up Physics

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VOLUME 11 • ISSUE 2  
SPRING 2009



# Women Flock to Physics

## TWO DEDICATED PROFESSORS AND A FEW SLICES OF GIBANICA WORK MIRACLES

BY JIM RAPER

**O**n a winter's evening a dozen or so Old Dominion University physics graduate students are sitting in a circle struggling with words such as *gibanica*, *pasticada*, *kokos-rolat* and *cokoladne kuglice*. An eclectic glossary is employed every day by these students in the practice of their science. They can tell you everything you need to know about Avogadro, coulombs, niobium and quarks. But they clearly need to brush up on *gibanica* and the other buzzwords of the evening.

This does not seem to daunt them, however. They are not as interested in pronouncing *gibanica* (*ghee-ba-nit-sa*) as they are in tasting it.

The students are young women aiming toward doctoral degrees in physics at ODU and the fact that there are so many of them has something to do with *gibanica* and many other dishes that have been prepared for them by two of ODU's top-ranking physics faculty members, both of whom are women.

In the United States, only about 17 percent of the Ph.D. students in physics are women. At ODU in the spring of 2009, the percentage was 32.6, almost twice the national average. The raw numbers: 15 women out of a total of 46 physics doctoral students.

This is a statistic that brings smiles to the faces of Gail Dodge, who is the





ODU women in physics, (from left) Leposava Vuskovic, Mary Hing-Hickman, Sharon Careccia, Milka Nikolic, Laura Russell (foreground), Donika Plyku, Gail Dodge, Marija Rasković, Asli Tandogan (foreground), Ana Samolov, Jan Drake, Subashini De Silva (foreground) and Maha Omar.

chair of the Department of Physics, and Leposava Vuskovic, the internationally known expert in atomic physics who also cooks a delicious, flaky, cheese and phyllo pastry called gibanica.

For about a dozen years now, Dodge and Vuskovic have been inviting female students (both undergraduate and graduate), as well as postdoctoral research associates, in the department to their homes for what ostensibly are dinners, but always turn into rap sessions about physics and the challenges that women face in a traditionally male profession. The professors have settled in recent years on a two-dinners-per-semester schedule, and occasionally they invite female physics students or other researchers from Thomas Jefferson National Accelerator Facility or the College of William and Mary.

## Homemade Comfort Food

Dodge, who came to ODU in 1995, is a nuclear physicist with degrees from Princeton and Stanford. She says she and Vuskovic host the dinners because they want to create a supportive environment for women in the department, as well as to encourage the women to form their own sorority, of sorts. “We feel that this activity helps the women to connect with and mentor each other, as well as helping

them to feel comfortable talking to us if they have a problem,” she explains.

“Comfortable” also is a word that Vuskovic uses when she gestures with a sweep of her arm toward the young women who have come to her home in a Norfolk riverfront community to eat gibanica, followed by vinegar- and bacon-laced stewed beef called pasticada. There is a thoroughly American-looking platter of vegetable salad to go along with the other dishes, but everything else, including the hostess’ half-dozen different dessert creations, hails from the land that once was Yugoslavia. Vuskovic is from that part of Yugoslavia that is now Serbia, and she was educated and taught in Belgrade before joining ODU in 1993.

“It is a relaxed time when we get together,” Vuskovic says. “We leave behind the pressures of the university.”

Janette Drake, one of the doctoral students, adds, “Being able to sit around and discuss personal, political and educational issues helps to make all the women in our department feel at ease. And this shows in the fact that we do have such a large population of female graduate students.”

The turnout at the dinners hasn’t always been so large. In 2001, ODU registered closer to the national average, with about 17 percent of its physics doctoral students being women. That number has risen each year since then to the current 32.6 percent. Nationally, the percentage stood at about 3 percent in 1973, so the overall trend is angling up.

Still, a 2007 report titled "Gender Equity" from the American Physical Society (APS) lamented that at the current growth rate, it will be 2028 before women make up 25 percent of the country's doctoral students in physics.

## Females Drift Away from Physics

Dodge and Vuskovic are the two women on a 20-person physics faculty at ODU, giving the university a female-to-male ratio of 1-to-10, which is the national average. About 11 percent of the degree-granting physics departments in the United States are like ODU in having a woman as chair.

"The physics workforce in academia and national laboratories remains one of the last areas in science where women are significantly underrepresented relative to their proportion in the population," the APS report states. "The reasons for this imbalance are many, as are the solutions, but the primary motivation for changing this situation should be to provide greater encouragement to women to enter and remain in physics."

The APS report notes that half of the high school physics students in the United States are girls, but that a significant "leak" starts in higher education, where even at the bachelor's level females are awarded only about 25 percent of the degrees.

Dodge sees two separate challenges. One is getting females to begin university physics programs and the other is to keep them from quitting once they start. "Perhaps the biggest hurdle is getting them to begin in the first place," she says, noting that it was an inspiring, male high school teacher who helped her pick her career path. Her resume is rich in community service, much of it physics- and science-related outreach to public school students. Still, she acknowledges that the strongest contribution she can make at present to women in physics is to create a supportive environment in the department for the females who have already chosen to major in physics.

The students at the women's dinner counted several reasons for their large numbers in their department. The first was the comfortable climate, but also they pointed to the opportunity to be mentored by two top-tier female physicists; to ODU's good reputation in physics, espe-

cially nuclear and atomic physics, and the university's establishment in 2008 of a Center for Accelerator Science; and, finally, to the university's cooperation with the Thomas Jefferson National Accelerator Facility, the \$600 million atom-smashing electron accelerator in Newport News. Both Dodge and Vuskovic do research at and in conjunction with Jefferson Lab.

A 2005 report published in *Science* magazine found that women planning careers in science or technology are often thwarted by the lack of role models and encouragement, as well as by hostile campus climates and unconscious discrimination. (See sidebar.) The American Institute of Physics reported in 2006, based on a survey of about 1,400 women physicists in 70 countries, that the underrepresentation of women in the field was, with few exceptions, a global issue. "I always have to justify why I as a woman have chosen physics. Men never get that question," wrote a Swedish respondent on her survey form.

Vuskovic shakes her head when she is asked about barriers she faced as a physics student. "It was different, totally different in Belgrade," she says. After World War II, Yugoslavia had a diminished male population and the economy was so poor that women were forced in great numbers to take jobs outside the home, she explains. "The study of science was open to women and men, and I did not feel discrimination."

## Gender-based Difficulties Minimal at ODU

Both Vuskovic, who is a Fellow of the American Physical Society and received ODU's Doctoral Mentor Award for 2008, and Dodge, who received the College of Science Faculty Excellence Award in 2003, are known for their genial natures and positive outlooks. So they are not likely to dwell on obstacles, and the climate they have fostered in the department is remarkably relaxed about gender issues.

As a physics student, Drake says, she has never experienced any problem related to her gender. "I believe that my male colleagues, both here at ODU and at the various conferences I attend, do not see me as just a woman, but as a fellow physicist and researcher. Of course, having two female mentors helps. Dr. Dodge has always been interested in making sure that all students in our department feel safe and secure both with their classes and also in life. Dr. Vuskovic is the same, and I



# Still Plenty of Room for Improvement for Women in Science

Physics is not the only field in the sciences that has a hard-to-shake tradition of being male-dominated. At Old Dominion University, as well as throughout the nation, many fewer women than men are found in graduate programs in geology and computer science.



Carol Simpson, who became ODU's provost in 2008, is an expert in structural geology and tectonics and a Fellow and councilor of the Geological Society of America. But she acknowledges that her professional experiences include some that were very discouraging. When she began her geology studies in the United Kingdom in the 1970s, she remembers, "The department head said, 'Carol, you are wasting your time. There are no jobs for women in geology.'"

When she interviewed for faculty jobs, the treatment was sometimes worse. "During one of my early interview dinners, a dean and department head, both male, became obnoxiously drunk and sent me off to help in the kitchen. During another interview, the chair of a male-only department gave me a field exam to test if a woman could really do field geology, and also asked me to spend an evening socializing with the faculty wives. Neither task was required for any of the male candidates."

Simpson adds, "However, as geology became more focused on analytical and quantitative analysis, and less about climbing mountains with sacks of rocks and bottles of whiskey in remote, bear-infested regions, the number of women students began gradually to increase."

For Nora Noffke, an associate professor of geology at ODU who has won broad recognition for her work with fossil evidence of microbes on Earth nearly 3 billion years ago, her opportunities as a woman in the sciences began to open when she emigrated from her native Germany to the United States.

"During my diploma and Ph.D. work in Germany, I ran into difficulties with my advisers, who did not value a female student with a lot of energy and her own ideas," Noffke says. "Things for me changed drastically when I came to the U.S. to do postgraduate research. For the first time, my work was valued when I conducted my research at Harvard University with Professor Andy Knoll, and with colleagues from MIT. I applied for faculty positions here in the U.S. and received five job offers right away. What a difference from Germany! Here, I enjoy participating in our search committees and it never has been a question if the candidate is female or male. People have not even mentioned it."



Michele Weigle, a young assistant professor of computer science at ODU who has significant research funding from the National Science Foundation, believes more female faculty members in her field will promote gender equity among computer science students.

"My undergraduate adviser was a significant influence on my career," she says. "She helped me develop confidence to continue in the field of computer science and eventually become a professor. Because of the small numbers of women in my computer science classes, there wasn't much of a peer group that I could turn to when things got difficult. My adviser was always willing to talk about her experiences in computer science classes where she was the only woman present.

"Her encouragement kept me from changing my major and put me on the path to graduate school with the goal of becoming a professor," Weigle adds. "To encourage more women to pursue and continue in fields in which there have been traditionally low numbers of women, it is vitally important to have female faculty members. Not only is the opportunity for mentoring available, but also it can be encouraging for female students to have proof that women can, and do, succeed in the field."

believe I have excelled because of her help and support as my research adviser.”

Another doctoral student, Mary Hing-Hickman, adds, “Despite the low number of women entering physics, ODU has never made me feel as if I would contribute less because I am a woman. I would say that the women’s dinners only solidified what we all experience with all of our professors. I’ve heard horror stories from other universities, but those things didn’t occur at ODU.”

Dodge, who has a daughter in elementary school, is also known for helping women in her department cope with care-giving pressures at home. Hing-Hickman, who has been working on her Ph.D. for over a decade, says the department has “allowed me to continue my research part time through the birth of my two sons and continues to help and guide me through the Ph.D. process.”

## Outreach to Males, Too

Sharon Careccia, another student at the dinner, breaks into a laugh when the subject of a “male-dominated field” comes up. She grew up with only brothers as siblings, she served in the Navy on a ship with 14 male crewmen for every female, and then she worked for awhile in engineering technology, which is a field distinctly male-dominated. “So starting a physics career was not that big of a change for me. I have always worked well with men. I do find that having a woman for an adviser and a mentor has been a wonderful experience and one I have never had before.”

Both Dodge and Vuskovic emphasize that they are careful not to slight male students while they are helping females. For both genders, Vuskovic says, “When I accept graduate students in my research program I am accepting them into the circle of my intellectual family.” She and her husband, ODU physics researcher Svetozar Popovic, invite male students to their home sometimes, too, to celebrate special occasions. “I always find time to talk with my students in both professional and private matters as much as this is needed,” she says.

There is a large contingent of international students among the females in physics at ODU, and Vuskovic believes that by sharing her experiences gained from immigrating to the United States she can help ease pressures on students from India, Serbia or Egypt. “Almost all of my graduate students began as socially insecure people. International students, in particular, are rarely exposed to the environment of a developed democratic society. For that reason, I do all I can to expose my students to various social and professional environments in order to develop their communication and social skills.” For instance, Vuskovic says, she insists on sitting with her students at conference banquets and introducing them to prominent researchers.

Dodge agrees that the physics Ph.D. program is so demanding that male students, too, need a lot of encouragement to stick with it. Day in and day out, she adds, the support she gives to students has a lot less to do with gender than it does with physics.

