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Press release

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Basic research at the highest level

Bioinformatician Dr. Sara Hetzel and mathematician Dr. Alexandra Quitmann receive the Marthe Vogt Award for outstanding young female scientists.

In 2024, the Forschungsverbund Berlin e. V. (FVB) will honor two early career researchers with the Marthe Vogt Award, endowed with €3,000. Both Dr. Sara Hetzel and Dr. Alexandra Quitmann have presented outstanding dissertations in their respective fields. Traditionally, the award goes to a female scientist from the Berlin-Brandenburg region who has finished her dissertation in one of the research areas of the FVB institutes. An award committee consisting of members of FVB's Executive Board decides which nominee will receive the award. This year, the committee was chaired by Professor Dr. Dorothea Fiedler, Deputy Executive Board Spokesperson and Director at the Leibniz-Forschungsinstitut für Molekulare Pharmakologie (FMP). The committee chose two winners.

Award winner Dr. Sara Hetzel from Berlin is a bioinformatician. Her work, entitled "Investigation of DNA methylation heterogeneity in cancer," deals with the analysis of data generated by DNA sequencing. Cells have different functions – nerve cells, for example, have completely different tasks than muscle cells. But all cells in an individual organism have the same set of DNA. Nevertheless, each cell knows exactly what it is supposed to do, i. e., which parts of the entire DNA are important for its function and which are not. To work with the information contained in a gene, the gene is quasi read like a hard drive. DNA methylation is one way to control which genes are accessed. The reading of a particular gene can be prevented by attaching methyl groups to a piece of DNA. This process can also be reversed to reactivate silenced regions of DNA.
The methylation pattern of most cancers is characteristically different from that of healthy cells. Hetzel's work consisted of developing software that could efficiently analyze the heterogeneity of DNA methylation in cancer cells. She made the software publicly available so that researchers could use it for their work and gain valuable insights. She also analyzed the data herself, using her software to study the differences between cancer cells grown in the lab and used to test drugs, and cancer cells in the human body.
In her research at the Max Planck Institute for Molecular Genetics, Hetzel is not looking for a specific treatment method or medication, but is investigating the basic functional mechanisms of cancer cells. This basic research is not always easy to explain because it has no direct clinical consequences. "But," Hetzel stated, "even if I can't always name all the future applications of my research, it's important to understand how something works so that, for example, medication and therapeutic methods can be developed or refined later."
"Dr. Hetzel's research results have advanced our understanding of DNA methylation and its function in the context of human disease and therefore have great potential for translation," the jury reasoned.

Mathematician Dr. Alexandra Quitmann also conducted outstanding basic research in her field at the Weierstrass Institute for Applied Analysis and Stochastics. In her dissertation, "Phase transitions in random loop models," she ventured into one of the biggest problems in statistical mechanics, Bose–Einstein condensate. In 1924, physicist Satyendra Nath Bose asked Albert Einstein for help with a publication. This collaboration led to a groundbreaking research hypothesis: the existence of a state of a gas of bosons – certain quantum mechanical particles – that can arise under extreme conditions, now known as "Bose–Einstein condensate". When Bose–Einstein condensation occurs, the

boson gas develops unusual properties such as superfluidity, supersolidity, and coherence over very long distances. Understanding this state of matter may enable the development of new technologies in the future, such as an ultrafast quantum computer.
Quitmann focused on physicist Richard Feynman's stochastic reformulation of the model. Feynman described the boson gas as a system in which the particles combine to form random loops. In a Bose–Einstein condensate, the loops are of macroscopic length. The mathematical proof of this phenomenon is extremely complex due to the interactions of the particles. Quitmann proved the existence of such macroscopic loops.
"The special thing about mathematics," said Quitmann, " is that it is essential to discuss your research with colleagues, not only when you have reached a dead end, but also when you think you have discovered something." The proportion of women in mathematics who continue to work in research after completing their doctorates is still comparatively low, even though the ratio of male to female first-year students is almost 50:50. For Quitmann, who has already promoted women in stochastics in her graduate college, this award is therefore a "great honor and recognition."
The award committee was impressed with her work: "Alexandra Quitmann has made great progress in describing a very complex problem, the formation of a Bose–Einstein condensate."

The award ceremony takes place on November 7, 2024 at the Leibniz Headquarters in Berlin-Mitte as part of Berlin Science Week. The event is a highlight in the program of the Forschungsverbund year after year. The prize was first awarded in 2001, and since 2016 it has been named after the brilliant pharmacologist Marthe Louise Vogt.

URL for press release: https://www.fv-berlin.de/en/careers/marthe-vogt-preis

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