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Jugend forscht 2026: VDE Special Prize for Battery Aging Simulation

Arthur Messerschmidt and Eric Frommherz have been awarded the VDE Special Prize at Jugend forscht. In their project "Math Battery," the two developed a new numerical simulation that can better model the aging of lithium-ion batteries. The key innovation: Instead of modeling the so-called active particles—which contribute to aging—as uniform spheres, they model them as ellipsoids.

(Frankfurt am Main, June 1, 2026) This year's edition of Jugend forscht came to a close over the weekend with the ceremonial presentation of the main and special prizes. A total of around 11,000 children and young people had participated in the various rounds of the Jugend forscht 2026 competition. On the last weekend in May, 116 project teams had the opportunity to present their projects at Schaeffler AG, this year's sponsoring company; the best of them were awarded main and special prizes. Since the 1996/97 competition round—marking the 30th time in 2026—the VDE has supported Jugend Forscht with a special prize for a project in the field of electronics, energy, or information technology, which is endowed with 1,000 EUR.

In 2026, Arthur Messerschmidt from Justus-Knecht-Gymnasium in Bruchsal and Eric Frommherz from Gymnasium Karlsbad received this award for their paper "Math Battery – Numerical Simulation of Ellipsoidal Active Particles in a Battery," in which they developed a method to better understand the aging process of lithium-ion batteries. Their model differs from previous approaches primarily in that it treats the so-called active particles—in which lithium ions accumulate over time and thus contribute to aging—not as spheres, but as ellipsoids of varying sizes and shapes; as a look through a microscope shows, this is closer to reality. "Especially at the beginning and end of a discharge process, when it is particularly important, our model matches the scarce experimental data very closely," says Arthur Messerschmidt, not without pride.

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The two high school students from Baden-Württemberg invested a total of one and a half years in the topic as part of the Hector Seminar student support program, combining various disciplines such as physics, chemistry, electrical engineering, and mathematics. “One of the biggest challenges was getting up to speed on the existing research on the topic right at the start,” recalls Eric Frommherz. The high school senior can very well imagine studying electrical engineering in the future. His teammate Arthur Messerschmidt can also see himself pursuing a career in electrical engineering, but he still has a year left before graduating.

With their simulation program, it might be possible in the future to optimize the charging and discharging of batteries, causing them to age more slowly. This is an important point, especially in times of transportation electrification and the restructuring of power grids. “Perhaps our approach is a small step in that direction,” says Messerschmidt. After all, progress consists of many small steps.

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