

Karl-Heinz Rädler (1935–2020)



Karl-Heinz Rädler died on the 9th of February 2020 at his home near Potsdam at the age of 85 years. He is known for his path-breaking contributions to the development of cosmic dynamo theory. Together with Max Steenbeck and Fritz Krause, he presented a rigorous derivation of the α effect in 1966. A few years later, after their work became known in the West, many scientists around the globe applied their theory and started working on models of solar and Galactic dynamos. The field of mean-field dynamo theory was born, and it started a new industry in astrophysics.

The roots of what is now sometimes referred to as the Potsdam Dynamo School go back to an earlier episode that started in Jena. After graduating from the University of Leipzig, Karl-Heinz Rädler developed his lifelong interest in the origin of cosmic magnetic fields when he took up a position as an assistant at the Institute for Magnetohydrodynamics at the Akademie der Wissenschaften in Jena. He joined the group of Max Steenbeck, where the theory of averaged magnetic fields was formulated and where he defended his PhD thesis “Zur Elektrodynamik turbulenter leitender Medien.” It marked the beginning of a new discipline of mathematical physics, dealing with the equations of magnetohydrodynamics in turbulent media.

In the 1970s, the research activities were moved to the Zentralinstitut für Astrophysik at Potsdam. This activity significantly shaped the profile of the Institute and contributed to its high international standing. Until today, many of the theoretical, numerical, and experimental studies of magnetohydrodynamics are based

on the monograph “Mean-field Magnetohydrodynamics and Dynamo Theory” by Krause and Rädler of 1980.

After the Fall of the Iron Curtain, owing to Rädler's scientific competence and personal integrity, as well as his democratic way of thinking, he was elected as the spokesperson of the scientific council of the Institute. Professor Rädler was chosen to become the founding director of what became the new Astrophysical Institute of Potsdam on the premises of the old observatory at Babelsberg. During that time, the Institute started collaboration with the Large Binocular Telescope in Arizona, as well as the telescope systems GREGOR and STELLA at Tenerife. It was also during this time when K.H. Rädler was active as the Editor-in-Chief of the *Astronomische Nachrichten*/Astronomical News. Another scientific highlight was his involvement in the theoretical underpinning of the Karlsruhe dynamo experiment in the late 1990s. Using the mean-field approach, he and his team in Potsdam prepared detailed predictions for the excitation conditions and saturation behavior for the dynamo experiment.

Karl-Heinz Rädler remained an acting master of the field until his last years. Particularly noteworthy is his work of 2005, when he devised a numerical procedure for computing the full set of turbulent transport coefficients. With that, mean-field dynamo theory became an accurate and predictive tool beyond the realm of quasilinear theory.

In celebration of Rädler's 75th birthday, friends and colleagues presented their latest research in Stockholm on the “ α effect and beyond.” Some of the contributions in the special issue of *Geophysical and Astrophysical Fluid Dynamics* provide a lasting memory of this. His lifelong accomplishments have been honored by the *Astronomische Gesellschaft* through its award of the Karl Schwarzschild medal of 2013.

His very last big contribution to the community was as one of the guest editors of the *Journal of Plasma Physics* of 2018 with the title “50 years of Mean Field Electrodynamics,” which fittingly characterizes a subject of which he was part of since the very first hour.

Axel Brandenburg
Günther Rüdiger
Guenther Ruediger
Email: gruediger@aip.de