

# PhD on the topic: Towards True and Reliable Analog Resistive Switching in 1T1R CMOS-compatible RRAM devices

**The REACT MSCA DN Project:** Self-awareness in humans is an innate capability, arising from the brain's ability to process a multitude of sensory inputs. Emulating this functionality in electronic systems—commonly referred to as neuromorphic computing—holds the potential to create highly intelligent machines capable of supporting a wide range of everyday applications, from autonomous vehicles to smart navigation systems. However, realizing neuromorphic computing in practice presents significant challenges, particularly in the areas of energy efficiency, reliability, and security.

The REACT MSCA Doctoral Network addresses these challenges by developing a neuromorphic platform that is inherently self-aware in terms of energy consumption, secure operation, and system reliability. As part of this initiative, 15 doctoral candidates (DCs) will be trained through a comprehensive, interdisciplinary program spanning material science, device physics, computer architecture, hardware prototyping, compiler design, simulation and emulation tools, as well as cybersecurity, reliability, and system verifiability.



REACT offers a uniquely structured training environment, combining academic excellence with industrial collaboration. DCs will benefit from close mentorship by leading researchers and industry experts, while also developing essential skills in scientific writing, research ethics, time management, and entrepreneurship.

By the conclusion of the REACT project, participants will be well-equipped to pursue impactful careers across academia and industry, with the REACT program serving as a strong foundation for their future success.

## Organization:

IHP is an institute of the Leibniz Association and conducts research and development of silicon-based systems and ultra high-frequency circuits and technologies including new materials. It develops innovative solutions for application areas such as wireless and broadband communication, security, medical technology, industry 4.0, automotive industry, and aerospace. IHP employs approximately 380 people. It operates a pilot line for technological developments and the preparation of high-speed circuits with 0.13/0.25  $\mu\text{m}$ -SiGe-BiCMOS technologies, located in a 1500 m<sup>2</sup> cleanroom that meets the highest industrial nanotechnology requirements. The candidate will join the Materials Research Department, led by Prof. Dr. Christian Wenger. Within the department, they will become part of the Adaptive Materials team, which focuses on the characterization and optimization of Resistive Random-Access Memory (RRAM),

under the co-supervision of Dr. Tommaso Rizzi. Concurrently, the candidate will be enrolled in a doctoral program of the Zernike Institute for Advanced Materials (ZIAM) at the University of Groningen, with Prof. Dr. Beatriz Noheda as the PhD promoter. The candidate is expected to undertake one or more secondments during the first three years of the project.

#### **Qualification & Eligibility:**

- Mobility Rule: Candidates must not have resided or carried out their main activity in “**host country**” for more than 12 months in the 3 years immediately before the recruitment date.
- PhD Rule: Applicants must not already possess a doctoral degree at the date of recruitment.
- Master degree or equivalent in Physics, Electronics or a comparable study area.
- Sound knowledge in Semiconductor Physics.
- Familiarity with basic of Electrical Characterization
- Good programming and scripting skills.
- Excellent English communication, presentation, and writing skills.
- Must be a team player.
- Knowledge of computing-in-memory is an added advantage.
- Knowledge of emerging non-volatile memory technologies is an added advantage.

#### **Conditions of employment:**

We offer you in accordance with the Collective Labour Agreement for **Land Brandenburg**:

- A salary of € 4,270 gross per month in the first year based on a full-time position.
- A temporary position of three years.
- Supervision agreement is a part of PhD program.
- **Intended start date:** November 1<sup>st</sup>, 2025

#### **Application:**

Please submit the following material, concatenated in a single PDF file and upload this file as your ‘CV’ by means of the application form at [Vacancies – project-react.eu](https://vacancies-project-react.eu).

- A cover letter motivating your application and detailing the motivation to apply for this specific PhD project (1 page max).
- An academic CV.
- A research statement (2 pages max) describing your personal research interests and previous research projects.
- A certified list of grades from your undergraduate degree(s) up to the moment of application (in case your MSc degree has not yet been awarded).
- The names and e-mail addresses of 2 academic referees who are willing and able to write recommendation letters for you, including the supervisor of your MSc research project.

You may apply for this position until 31 October 11:59pm / before 1st November 2025 Dutch local time (CET) by means of the project website [Vacancies – project-react.eu](https://vacancies-project-react.eu). Applications will be evaluated as received.

It is important to IHP to support the individual career development (e.g. conferences, advanced training) as well as the personal needs of our employees by offering flexible working hours and the possibility to work off-site. The compatibility of work and family is highly valued. More information about our scientific excellence and the working environment at IHP can be found on our website.

IHP is TOTAL E-QUALITY-certified for equal opportunities for women and men in the workplace and actively pursues equality for all genders and all groups of people. We support the professional development of women and encourage them to apply. Disabled candidates who meet the above criteria will be given preference over other candidates with equivalent relevant qualifications.

Information

**For information you can contact:**

- Dr Tommaso Rizzi, [rizzi@ihp-microelectronics.com](mailto:rizzi@ihp-microelectronics.com)

Please do not use the e-mail address(es) above for applications.