RAHMİ EREN ÇAKIR

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Physics undergraduate (Mechatronics minor) with hands-on research experience in perovskite/silicon tandem photovoltaics and quantum-dot photodiode fabrication, from cleanroom processing to device characterization and Geant4/SCAPS simulation. Seeking a master's position in micro- and nanotechnology, semiconductor devices or materials science.

Education

Middle East Technical University (METU), Ankara 08/2023 – 06/2027 (expected)
B.Sc. in Physics, Minor in Mechatronics CGPA: 3.21/4.00
Relevant coursework: Physics of Semiconductor Devices, Solid State Physics, Introduction to Lasers, Optics and Waves, Quantum Mechanics, Basics of Scientific Computation

Research Experience

Ludwig-Maximilians-Universität München (LMU Munich) Munich, Germany
Erasmus+ Research Trainee, Dr. Erkan Aydın Research Group 06/2026 – 09/2026

- Developed weldable front contacts and parallel gap resistance welding (PGRW) interconnection for space-compatible encapsulation of perovskite/silicon tandem solar cells, optimizing device performance and stability.
- Performed thin-film deposition via sputtering and comprehensive characterization including J-V, EQE, ellipsometry, profilometry, SEM and EDX.
- Work resulted in a co-first-author manuscript in preparation for *ACS Energy Letters*.

METU MEMS Research Center Ankara, Turkey
Candidate Engineer (TÜBİTAK 2247-C STAR Program) 09/2025 – 05/2026

- Worked on cleanroom fabrication of quantum-dot photodiodes (dicing, thin-film deposition, characterization), focusing on process optimization and quantum-dot integration.

Research Intern (TÜBİTAK 2247-C STAR Program) 02/2025 – 08/2025

- Conducted testing and performance characterization of quantum-dot photodiodes.

Betavoltaic Battery Simulation (TÜBİTAK 2209-A Project), METU 12/2025 – Present
Principal Investigator, Advisor: Prof. Ahmet Bingül

- Leading a funded project to develop a Geant4 library that models beta-particle energy deposition in semiconductor junctions and evaluates betavoltaic battery performance.

Globular Cluster Dynamics, METU 05/2024 – 03/2025
Undergraduate Researcher, Advisor: Dr. M. Atakan Gürkan

- Studied N-body, Monte Carlo and Fokker-Planck models of globular clusters; adapted Cluster Monte Carlo (CMC) code for Linux and wrote a direct N-body simulation of force distributions.

Publications

[1] C. Yilmaz[§], **R. E. Çakır**[§], P. M. Kalvikatte, M. Bouraoui, D. López Pascual, I. Valiente Blanco, A. Metzger, A. Hartschuh, and E. Aydın*, "Weldable Front Contacts for Space-Compatible Encapsulation of Perovskite/Silicon Tandem Solar Cells," *manuscript in preparation for ACS Energy Letters.*

[2] F. Aydın, E. Dirican, F. A. Koca, İ. Kolay, **R. E. Çakır**, and D. Asil*, "Interface Engineering in PbS QD Photodetectors," *manuscript in preparation for a Wiley-VCH journal.*

[§]Equal contribution *Corresponding author

Honors & Grants

- TÜBİTAK 2224-D Grant for Erasmus+ Research Traineeship at LMU Munich 2026
- TÜBİTAK 2209-A Undergraduate Research Project Grant (Principal Investigator) 2025
- TÜBİTAK 2247-C STAR Intern Researcher Scholarship 2025 – Present
- TÜBİTAK 2205 Undergraduate Scholarship 2023 – Present

Projects

- **RASIT Object Detection (Teknofest 2026):** Trained and optimized YOLO models on the VisDrone dataset for high-accuracy object detection in complex aerial scenes.
- **Autonomous Sumo Robot (ME220):** Designed and built an autonomous sumo robot using ultrasonic and IR sensors; developed motion control and competition strategy.

Skills

- **Fabrication:** Cleanroom processing, sputter deposition, dicing, parallel gap resistance welding
- **Characterization:** J-V, EQE, spectroscopic ellipsometry, profilometry, SEM, EDX
- **Simulation:** Geant4, SCAPS, LTspice
- **Programming & Tools:** Python, C, YOLO, Linux, GNU Make, CMake, LaTeX
- **Hardware:** Microcontrollers (Arduino, Raspberry Pi Pico), soldering

Languages

English (Fluent) • Turkish (Native) • German (A1) • Spanish (A1)

References

Available upon request.