

Results dissemination: conferences and journals

Context

Project: FELINES

PRIN 2022, grant number 20224CL7HM, Italian Ministry for Education, University, and Research and the European Union-Next Generation EU.

The research project Forecast of the Effects of Lightning IN Electrical Systems (FELINES) aims at designing a protection system capable of sensing phenomena that preliminary to a lightning event, and consequently disconnect part (or all) of the electric infrastructure under its protection. These phenomena are associated with the so-called Preliminary Breakdown (PB) pulses, localized events taking place during the first phases of the lightning inception.

Work Package 4: Coordination and Dissemination

Responsible Research Unit: UniGe

Task 4.2: Results dissemination: conferences and journals

The results will be published in several scientific journal papers (a special issue in an open access journal can be planned to give greater diffusion) and presented by attending scientific conferences and meetings.

Journal publications

- Sekehravani, E. A., Barmada, S., & Formisano, A. (2024). Modal Analysis for Induced Currents in Metallic Plates. *IEEE Transactions on Magnetics*, 60(12), 1-4.
- Nicora, M., Tucci, M., Barmada, S., Brignone, M., & Procopio, R. (2024). Lightning location and peak current estimation from lightning-induced voltages on transmission lines with a machine learning approach. *IEEE Transactions on Electromagnetic Compatibility*, 66(3), 890-899.
- Dodge, S., Nicora, M., Barmada, S., Brignone, M., Procopio, R., & Tucci, M. (2025). A deep learning based lightning location system. *Electric Power Systems Research*, 242, 111437.
- Barmada, S., Dodge, S., Brignone, M., Nicora, M., & Procopio, R. (2025). Relating transmission line overvoltages and lightning location: a machine learning-based procedure. *COMPEL-The international journal for computation and mathematics in electrical and electronic engineering*, 44(5), 769-783.
- Sekehravani, E. A., Dodge, S., Barmada, S., Brignone, M., Formisano, A., Mestriner, D., Nicora, M., & Procopio, R. (2025). Preliminary Breakdown Pulses (PBP): A review on available data and models. *Electric Power Systems Research*, 242, 111463.

- Dodge, S., Barmada, S., & Formisano, A. (2025). A STacked Adaptive Residual PINN (STAR-PINN) Approach to 2D Time-Domain Magnetic Diffusion in Nonlinear Materials. IEEE Access.
- Mestriner, D., Aramini, R., Brignone, M., Nicora, M., Procopio, R., & Randazzo, A. (2025). A method to include the effects of tortuosity in the electromagnetic field expressions produced by vertical lightning channels. IEEE Transactions on Antennas and Propagation, 73(11), 9092–9100. <https://doi.org/10.1109/TAP.2025.3605025>.
- Barmada, S., Dodge, S., & Formisano, A. (2025). Weak Formulation for Physics-Informed Neural Networks in the Resolution of Analysis Problems in Electromagnetics. IEEE Transactions on Magnetics.
- Formisano, A., Dodge, S., & Barmada, S. (2025). A Comparison of Machine Learning and Classical Numerical Approaches for the Resolution of Electromagnetics Problems. IET Science, Measurement & Technology, 19(1), e70034.
- Mestriner, D., Nicora, M., Brignone, M., Procopio, R., Zhu, Y., & Rakov, V.A. (2026). Modeling and Statistical Characterization of Preliminary Breakdown Pulses in Negative Cloud-to-Ground Lightning Flashes. Accepted for publication on IEEE Transactions on Electromagnetic Compatibility, doi: 10.1109/TEM.2026.3666274.

Conferences and Meetings

CEFC 2024, 21st Biennial IEEE Conference on Electromagnetic Field Computation (IEEE CEFC 2024, Jeju, Korea, 2-5 June 2024:

- Formisano, A., Barmada, S., & Sekehravani, E. A. (2024, June). Modal Analysis for Induced Currents in Metallic Plates. In 2024 IEEE 21st Biennial Conference on Electromagnetic Field Computation (CEFC) (pp. 1-2). IEEE.

CEM 2025, 12th International Conference on Computation in Electromagnetics, 8-11 April 2025, Bruges, Belgium:

- Formisano, A., Dodge, S., & Barmada, S. A Comparison of Machine Learning and Classical Numerical Approaches for the Resolution of Electromagnetics Problems.

XXXIX Riunione Annuale dei Ricercatori di Elettrotecnica (ET 2025), 12 - 13 giugno 2025, Villasimius (CA):

- S. Barmada, S. Dodge, M. Brignone, D. Mestriner, M. Nicora, R. Procopio, A. Formisano “Metodo di Previsione Fulmini e Prevenzione per Sistemi Elettrici (Progetto PRIN 2022 – FELINES)

COMPUMAG 2025, 25th International Conference on the Computation of Electromagnetic Fields, Naples, June 22 - 26 2025:

- D. Mestriner, M. Nicora, R. Procopio, M. Brignone, A. Formisano, E. A. Sekehravani, S. Barmada, S. Dodge, “Lightning Preliminary Breakdown Pulses Model Optimization”
- S. Barmada, S. Dodge, and A. Formisano, “Weak Formulation for Physics-Informed Neural Networks in the Resolution of Analysis Problems in Electromagnetics”

OIPE 2025, 18th International Workshop on Optimization and Inverse Problems in Electromagnetism will be held on September 8 – 12, 2025, in Lodz, Poland.

- S. Barmada, S. Dodge, A. Formisano, P. Di Barba, M. E. Mognaschi, “PINN-Based Resolution of Non-linear Magnetostatic Problems”

ISEF 2025, 22nd International Symposium on Electromagnetic Fields in Mechatronics, Electrical and Electronic Engineering, 23 – 25 September 2025, Baiona, Spain:

- S. Barmada, S. Dodge, A. Formisano, D. Mestriner, M. Nicora, “Lightning Preliminary Breakdown Pulses and Their Use for Real Time Transmission Lines Protection”

2025 International Symposium on Lightning Protection (XVIII SIPDA), Thessaloniki, Greece, 21-26 September 2025:

- Aramini, R., Brignone, M., Mestriner, D., Procopio, R., Randazzo, A., & Rubinstein, M. (2025). On the robustness of the reconstruction of return-stroke currents from measurements of the radiated magnetic field. In 2025 International Symposium on Lightning Protection (XVIII SIPDA) (pp. 1–6). Thessaloniki, Greece. <https://doi.org/10.1109/SIPDA68639.2025.11296664>
- Aramini, R., Brignone, M., Mestriner, D., Procopio, R., Randazzo, A., Rubinstein, M., et al. (2025). On the reconstruction of the current attenuation in non TL-type models by means of a regularization algorithm. In 2025 International Symposium on Lightning Protection (XVIII SIPDA) (pp. 1–5). Thessaloniki, Greece. <https://doi.org/10.1109/SIPDA68639.2025.11296704>
- Nicora, M., Procopio, R., Brignone, M., Dodge, S., Barmada, S., & Tucci, M. (2025). A deep learning model for lightning location and peak current estimation from induced overvoltages. In 2025 International Symposium on Lightning Protection (XVIII SIPDA) (pp. 1–6). Thessaloniki, Greece. <https://doi.org/10.1109/SIPDA68639.2025.11296771>