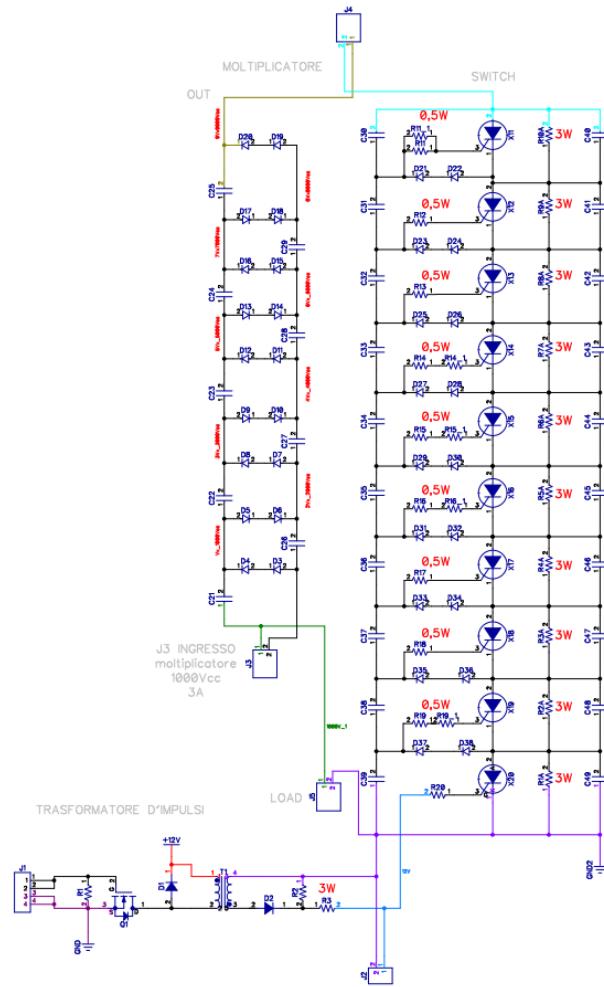


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«Next Generation PEF Systems and multilevel converters»

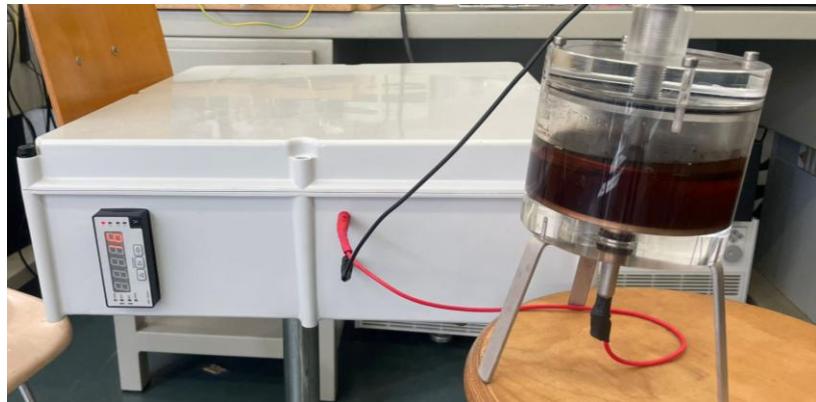
Ing. G. Ruggeri

Pulsed Electric Field (PEF) System



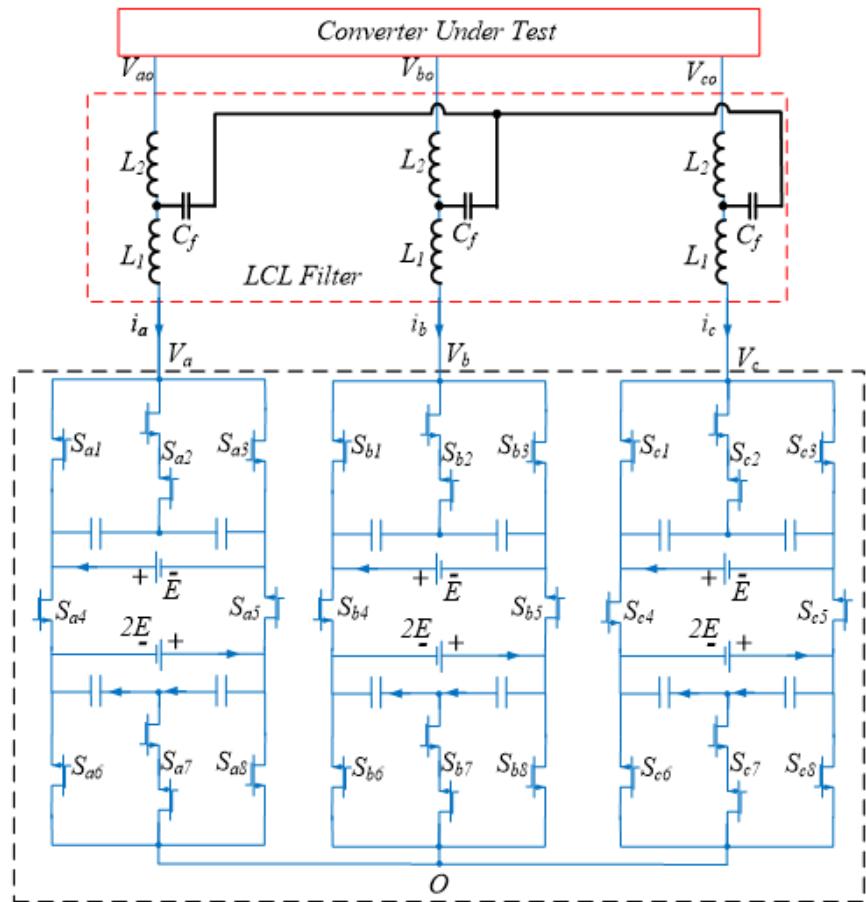
- **Low Voltage DC Bus (100V)**
- **FB Converter for AC Conversion**
- **Transformer insulation**
- **Medium Voltage output**
- **Cost-efficiency**
- **Industrial relevance**

Pulsed Electric Field (PEF) System



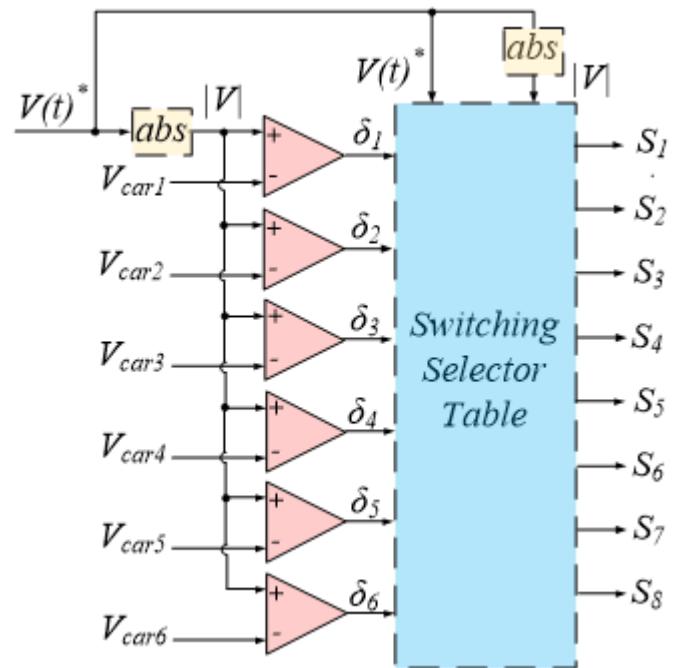
- **Ongoing testing**
- **Finished system and applications**
- **Different possible relevant sectors**

13-Level converter - Simulation



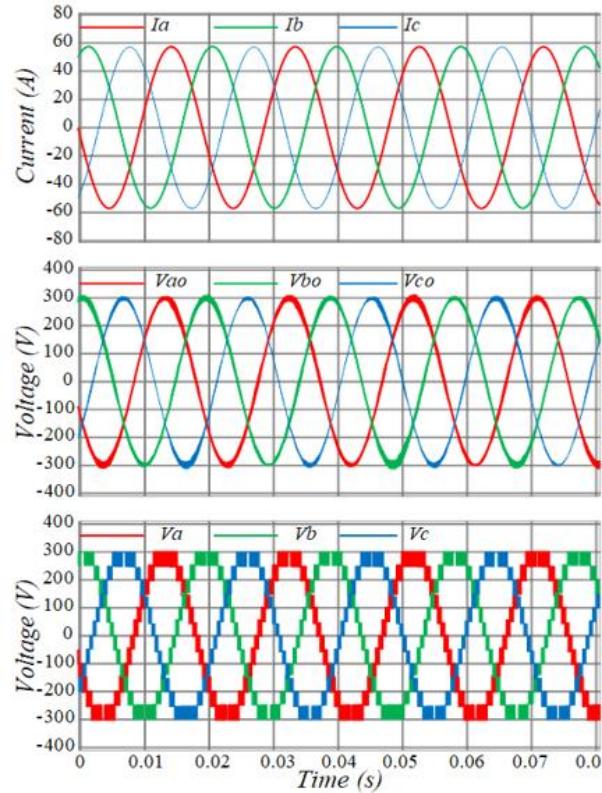
- Applications
- Cost-factor
- Filter relevance
- Chosen modulation
- Full course of development

13-Level Converter – Modulation Method

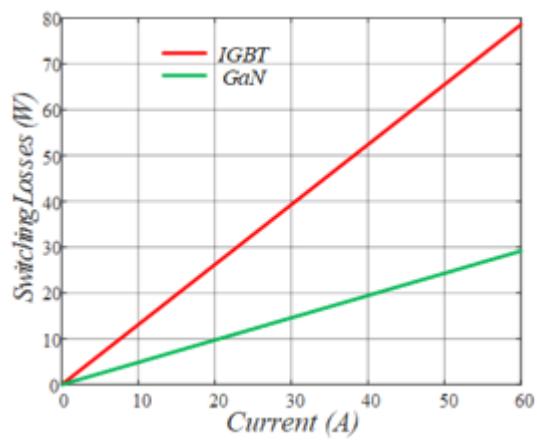


- **Sinusoidal Pulse Width Modulation**
- **Six carrier signals – One modulation signal**
- **Eight gate outputs**

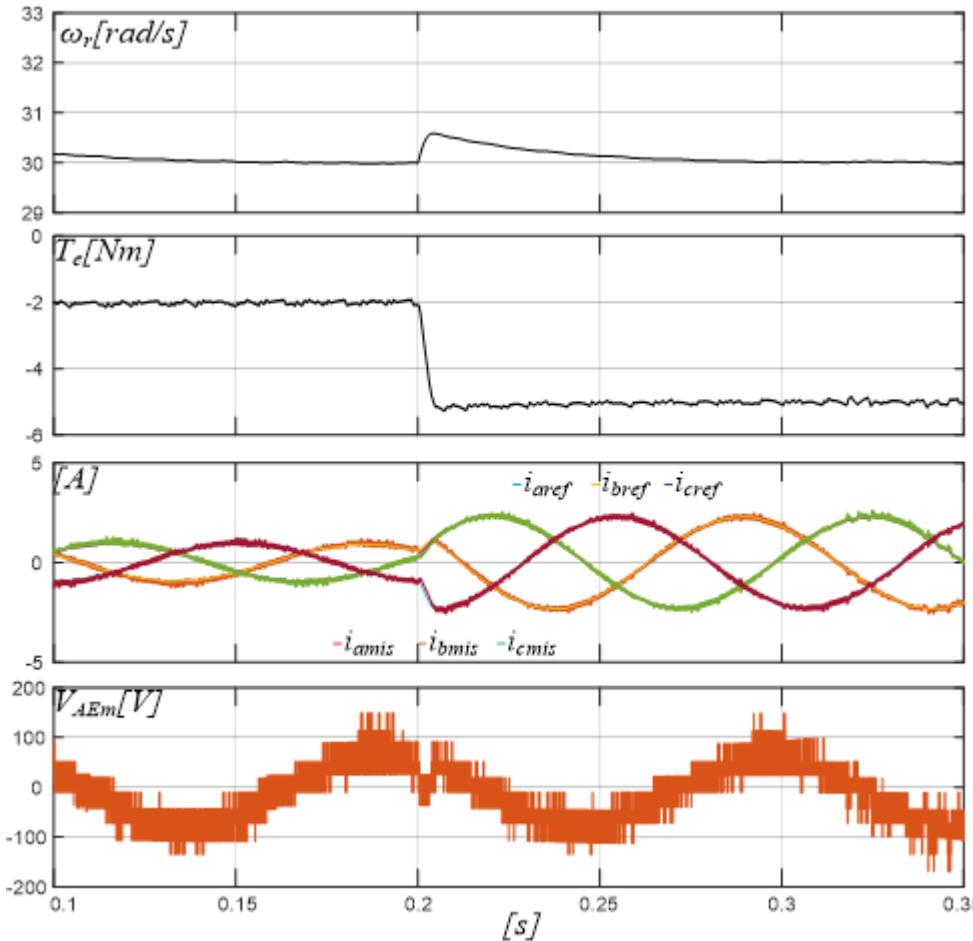
13-Level Converter – Output and Losses



- High-level count requires low filtering
- Next-generation WBG devices provide the lowest losses

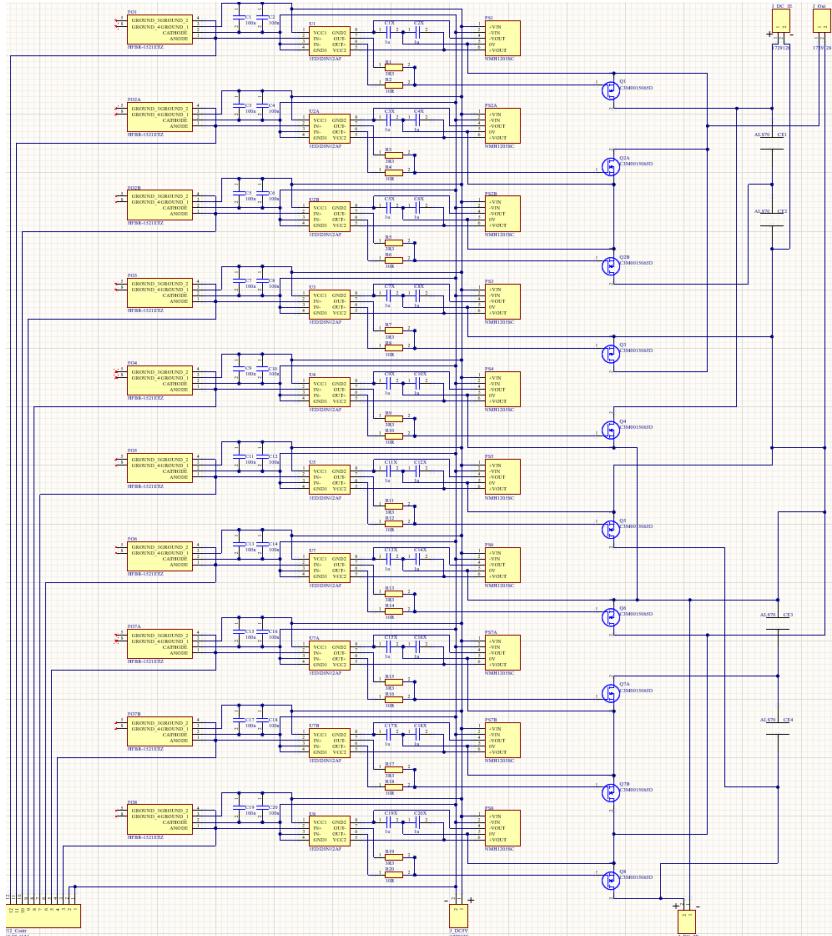


13-Level Converter – Prototype and Initial results



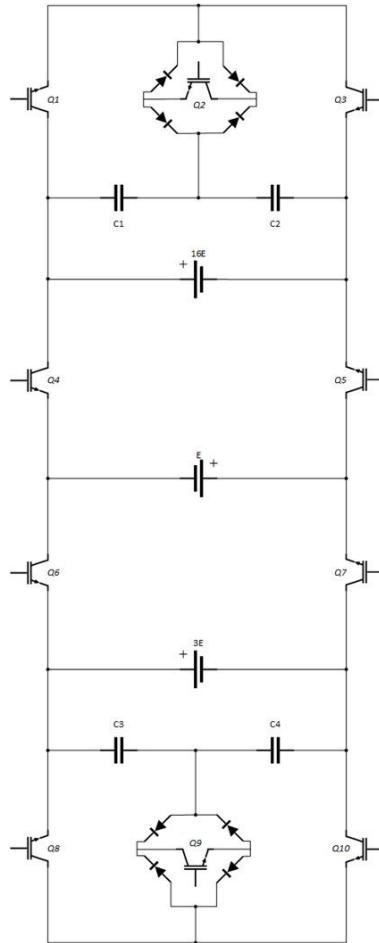
- Promising results from real-world testing
- Tested using an AC Asynchronous Motor

13-Level Converter – Final PCB design



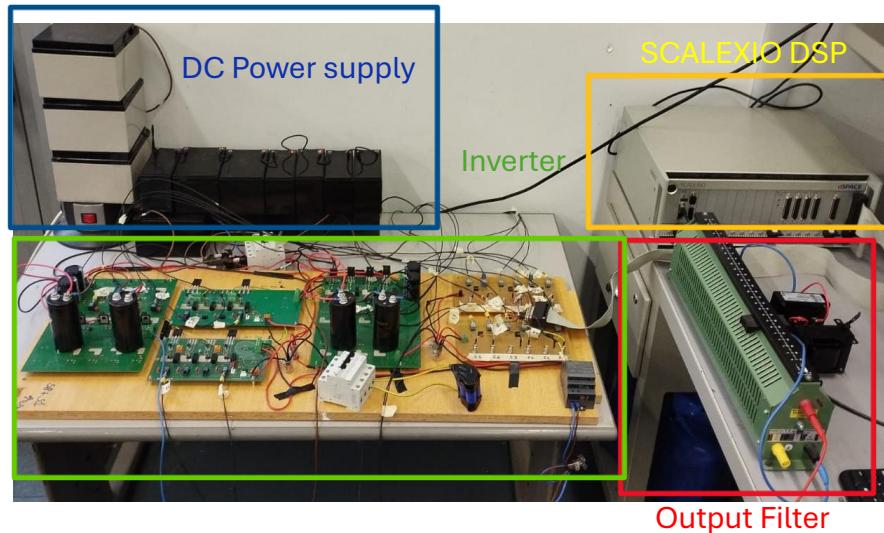
- Full Electric schematic
- Realized using AD Professional
- Currently in printing phase

35-Level Converter



- Same theory behind 13-level, one more polarity inversion module
- Full course of development

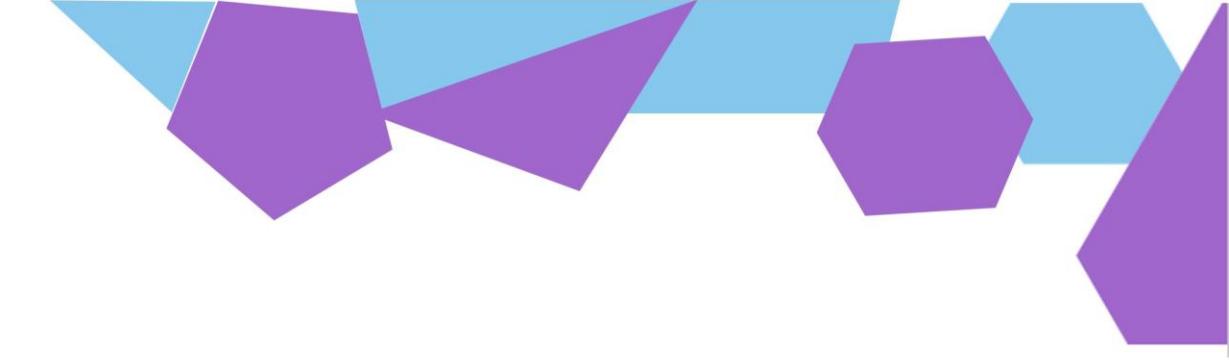
35-Level Converter – Initial Prototype



- **Modulation realized with dSpace SCALEXIO DSP**
- **Extremely low cost-factor**
- **Small filtering needs**

Next Steps

- **PEF: Efficacy tests on different sector-relevant items**
- **13-level converter: Finalizing development**
- **35-level converter: PCB design and final steps**



Thank you for your attention!

