



The Multinational Power Electronics Association

PSMA Magnetics Committee Meeting

January 23RD 2024

Ed Herbert, George Slama, Matt Wilkowski
Committee Chairs



PSMA is a not-for-profit organization and a CO-SPONSOR OF APEC



PSMA Magnetics Committee Meeting Agenda

January 23, 2024

- Introductions
- 2024 Workshop Planning
- 2024 Industry Session Planning
- Power Technology Roadmap
- Special Projects
 - Electrical parameters of magnetic materials
 - Core Loss Database
- Next Meeting



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PSMA Magnetism Committee Meeting Agenda – Workshop Planning

January 23, 2024

- Workshop Themes
 - Overall: Design of Optimal Magnetism Across Applications and Environments
 - Morning Session: Design and Optimization of Magnetism for Different Applications
 - Afternoon Session: Thermal design and other special issues such as insulation, partial discharge, etc.,
 - Tech Demos
- Industry Session Theme
 - Circuit and Construction Simulation and Modelling of Magnetic Components
- Propose not to cover core loss modelling for the 2024 workshop due to
 - Survey results requesting core loss modelling was based on a survey on Saturday March 18 however there were two PSMA Magnetism Committee related activities at APEC 2023 after the survey
 - George Slama Professional Education Seminar on Sunday March 19 – Core Loss Data for Everyone
 - Magnetism Committee Industry Session on Tuesday March 21 – Core Loss Measurements For Different Materials and Excitations
 - MagNet Activities will may results in some presentation and sessions on core loss modelling at APEC 2024
 - May have some tech demos related to MagNet

PINE AVENUE

PROMENADE LOBBY

MAIN ENTRANCE



PSMA Magnetics Committee Meeting Agenda – Workshop Planning

January 23, 2024

- From Tentative Agenda Workbook

Time	Event	Presenter	Affiliation	
7:00 AM - 8:00 AM	Breakfast Plus Technology Demonstrations			
8:00 AM - 8:05AM	Opening Remarks	Ed Herbert	PSMA	
8:05 AM - 8:45 AM	Keynote Speaker Power Magnetics Design - Design and Optimization of Magnetics for Different Applications - Intro	George Slama	Würth Elektronik	
	Opportunities for new magnetics designs to address a broad range of market driven technology trends across automotive and data center applications	Johan Kolar/Jannik Schafer	ETH	Accepted
8:45 AM - 9:20 AM	Technical Session - Design and Optimization of Magnetics for Different Applications			
	Advanced Algorithms in Magnetic Design: Trends in Modeling and Optimization	Jonas Muhlethaler	Frenetic	Accepted
9:20 AM - 9:40 AM	Q&A		Kolar, Schafer, Muhlethaler	
9:40 AM - 10:00 AM	Break			
	Technical Session - Design and Optimization of Magnetics for Different Applications - Part 2			
10:00 AM - 10:35 AM	Magnetics for VRM Applications	Qiang Li	Virginia Tech - CPES	Accepted
10:35 AM - 11:10 AM	Computer aided inductor optimization	Lukas Mueller	Micrometals	Accepted
11:10 AM - 11:45 AM	Low Inductance Film Capacitors For Inverter Applications	David Zawacki	Cornell Dubilier	Accepted
11:45 AM - 12:00 Noon	Panel Q & A		Kolar, Schafer, Muhlethaler, Li, Mueller, Zawacki	

Time	Event	Presenter	Affiliation	
2:00 PM - 2:50 PM	Keynote Speaker Addressing Thermal Design and other special issues as partial discharge, insulation, etc., Intro	George Slama	Würth Elektronik	
	Overview of special issues for the design of magnetics	Charliers Sullivan	Dartmouth College	Accepted
	Q & A		Sullivan	
	Technology Session - Thermal Design and other special issues as partial discharge, insulation, etc., - Part 1			
	Opening Remarks	George Slama	Würth Elektronik	
2:50 PM - 3:15 PM	Leading Edge Power Magnetics design - multi -physical, multi-dimensional Optimization Relative to Electrical, Thermal and Commercial Objectives	Roman Jamy	Yageo - Kemet	Accepted
3:15 PM - 3:40 PM	Characterization of Partial Discharges in High-frequency Transformer under PWM Pulses	Zhicheng Guo	Arizona State University	Accepted
3:40 PM - 4:00 PM	Break			
	Technology Session - Thermal Design and other special issues as partial discharge, insulation, etc., - Part 2			
4:00 PM - 4:25 PM	Thermal Issues with Power Magnetics	Subhashish Bhattacharya	NCSU	Accepted
4:25 PM - 4:45 PM	Panel Q & A		Sullivan, Roman, Guo, Bhattacharya	
	Closing Remarks			
4:45 PM - 5:00 PM	Best of the Best	Alex Gerfer	Würth Elektronik	Accepted
	Survey	George Slama	PSMA	Accepted
5:15 PM - 6:30 PM	Networking Hour			

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12:00 Noon - 2:00 PM	Technology Demonstration Session	George Slama	Würth Elektronik	
	Near field measurements useful techniques for electronics engineers	Arturo Mediano	HF Magic Labs	Accepted
	Computer Aided Inductor Optimization	Lukas Mueller	Micrometals	Accepted
	Core Loss Correlations Across Equipment and Different Core Materials	George Slama	Würth Elektronik	Accepted
	Using RedExpert for the Selection of Capacitors	Jon Izkue-Rodriguez	Würth Elektronik	Accepted
	Modelling of Integrated LLC Magnetics and High-Leakage Transformers	Andrija Stupar	SIMPLIS Technologies	Accepted
	Nanocrystalline-based CMC filters for EV – reducing footprint	Bharadwaj Reddy Andapally	CBMM	Accepted
	3D FEM-based software for low-frequency electromagnetic behavior in transformers and inductors	Juris Vencels	Trafo	Accepted
	Scaleable and Sustainable Electroplated Wafer Level Magnetics	Mohammad Khodadadi	EnaChip	Accepted
	AC Power Loss Measurements	Nadja Laeaeperi	Iwatsu	Accepted
	Non Linearity of metal alloyed powdered core with micro Pulse 2.0	JC Sun	Bs&T	Accepted
	Ferrites, What can be done with geometry?	Mike Arasim	Fair Rite	Accepted
	Streamlining Bobbin Design to Improve Winding Performance	Chuck Wild	Miles Platt	Accepted
	Posters			
	High-Density Vertical Power Delivery VRM with Twisted Core Inductor	Adhistira Naradhipa	CPES	Accepted
	Novel Single-Stage-Isolated 3- Φ /1- Φ AC Input EV On-Board Charger Employing Segmented Magnetic Shunt High Stray Inductance Transformers	Daifei Zhang	ETHZ	Accepted
	MagNet Challenge: What We Learned and What's Next?	Haoran Li	Princeton	Accepted
	MagNet Project: The Past and the Future	Shukai Wang	Princeton	Accepted
	Mode Analysis, Transformer Saturation, and Fault Diagnosis Technique for an Open-Circuit Fault in a Three-Phase DAB Converter	Shubham Rawat	NCSU	Accepted
	Magnetics for Medium Voltage DC-DC power converter systems	Ramandeep Narwal	NCSU	Accepted

- Standing at twelve (12) technology demos
 - Still need presentation title and presenter name from Iwatsu
 - May add one additional technology demo
- Six (6) student posters,
 - Need to confirm details for NCSU posters (Shubham Dhiman, Shubham Rawat, Ramandeep Narwal)

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PSMA Magnetics Committee Meeting Agenda – Industry Session Planning

January 23, 2024

Tuesday, February 27, 2024	
8:30 AM – 11:55 AM PST	<p>IS01 - Modelling and Simulation of Magnetics - Closing the Loop</p> <p>Industry Session Chair: George Slama – Würth Elektronik</p> <p>Industry Session Chair: Ed Herbert – PSMA</p> <p>PSMA Session</p>
8:30 AM – 8:55 AM PST	<p>IS01.1 - Magnetics Material Data for Simulation Tools</p> <p>Industry Session Presenter: Minjie Chen, PhD – Princeton University</p> <p>PSMA Session</p>
8:55 AM – 9:20 AM PST	<p>IS01.2 - Impedance Over Wide frequency Ranges for EMI Filtering</p> <p>Industry Session Presenter: Fang Luo – Stony Brook University</p> <p>PSMA Session</p>
9:20 AM – 9:45 AM PST	<p>IS01.3 - 2D vs 3D Finite Element Analysis of Magnetic Components? How to decide!</p> <p>Industry Session Presenter: Mark Christini, MSc, PE – Ansys</p> <p>PSMA Session</p>
9:45 AM – 10:10 AM PST	<p>IS01.4 - Modelling Magnetics in Circuit Simulation Tools</p> <p>Industry Session Presenter: Tom Wilson – SIMPLIS Technologies</p> <p>Industry Session Presenter: Andrija Stupar – SIMPLIS Technologies</p> <p>PSMA Session</p>
10:40 AM – 11:05 AM PST	<p>IS01.5 - Measurement and characterization of magnetic fields with near field probes</p> <p>Industry Session Presenter: Arturo Mediano – University of Zaragoza</p> <p>PSMA Session</p>
11:05 AM – 11:30 AM PST	<p>IS01.6 - Leakage Inductance and Coupling</p> <p>Industry Session Presenter: Bryce Hesterman – Utah State University</p> <p>PSMA Session</p>
11:30 AM – 11:55 AM PST	<p>IS01.7 - Thermal Modelling of Magnetic Components</p> <p>Industry Session Presenter: Juris Vencels – Trafolo</p> <p>PSMA Session</p>

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2022/2023/2024 PSMA PTR Webinar Series

Potential Contributions from the Magnetism Committee

- Tyndall – Ranajit Sai
 - Core Loss Mechanisms
 - Presentation delivered November 30 ✓
- Utah State University – Reebal Nimri
 - High Power (1 MW) Charging
 - 2024 Q2/Q3
 - Confirmed 8/16/23
- Fraunhofer – Florian Ziegler
 - PowderMEMS – a novel technology for fabrication of functionalized MEMS structures
 - Spring 2024
 - Confirmed 1/16/24
- CBMM - Bharadwaj Reddy Andapally
 - Technology Roadmap for Nanocrystalline Cores
 - Spring 2024
 - Confirmed: 9/1/23 – follow up sent December 15

Potential Source of Additional Presentations
Intermag Japan
Presentations
Measurement Techniques
New Materials

PSMA Magnetism Committee Meeting Agenda – Special Projects

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- Power Technology Roadmap
- **Special Projects**
 - Electrical parameters of magnetic materials
 - Proposal approved during PSMA BOD meeting on November 17
 - Preliminary results shared with PSMA Magnetism Committee during December 18 meeting
 - Final report pending
 - Core Loss Database
 - Special project proposal to be submitted for BOD at APEC 2024
- Next meeting

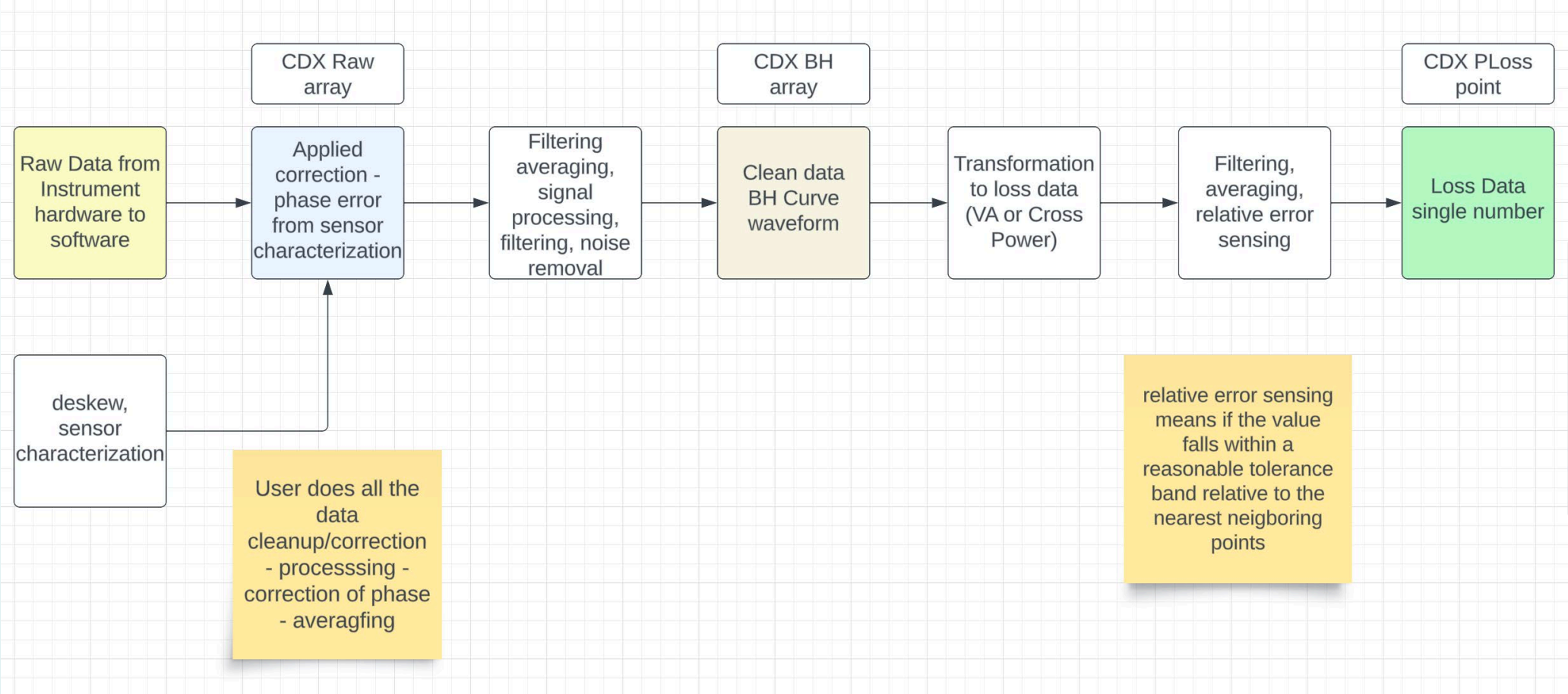
Electrical Parameters Project

Distribute current draft of phase 1 report to active committee members for review

Current report to be reviewed at magnetism committee meeting on February 28 before placing in Magnetism Technical Forum on PSMA Website

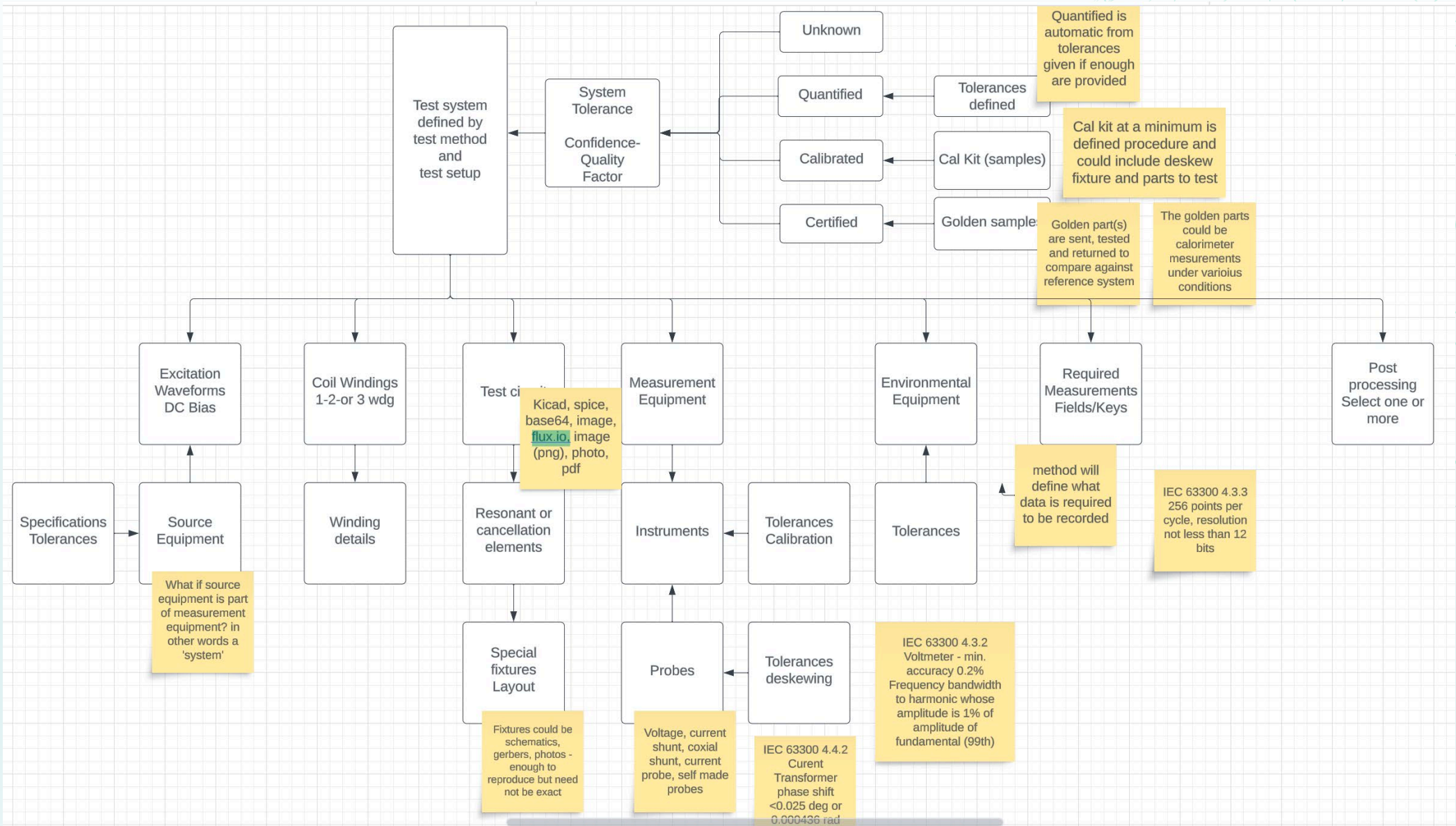
PSMA Magnetics Committee Meeting Agenda – Special Projects – Core Loss Data Base

January 23, 2024 – Current Plan



PSMA Magnetics Committee Meeting Agenda – Special Projects – Core Loss Data Base

January 23, 2024 – Previous Discussion of December 18, 2023



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PSMA Magnetics Committee Meeting Agenda – Next Meeting January 23, 2024

- Next meeting in-Person at APEC 2024
 - Venue:
 - Hyatt Regency Long Beach California
 - 200 S Pine Ave.
 - Long Beach, CA 90802
 - Room: Beacon A
 - Date: Wednesday February 28, 2024
 - Time: 12:00 Noon – 2:00 PM



PSMA Magnetics Committee Meeting

January 23, 2024

- Attendance (12)
 - John Horzepa
 - Joe Horzepa
 - Mike Arasim
 - Doug Eaton
 - Ed Herbert
 - Lukas Mueller
 - Jonas Muhlethaler
 - Alfonso Martinez
 - Rodney Rogers
 - Ranajit Sai
 - George Slama
 - Matt Wilkowski



Thank You

