Special Session XVI

Special Session Basic Information:

专栏题目 Session Title	中文：人工智能在新型电力系统优化和运营中的创新和应用 英文：Innovation and Application of Artificial Intelligence in Optimization and Operation of New Power Systems

专栏介绍和征稿主题
Introduction and topics

中文：

随着能源转型进程提速，电力系统呈现多资源整合、多系统协同、多场景适用的复杂演进态势。风电、光伏等可再生能源大规模并网，对电力供应稳定性形成严峻挑战；极端天气频发，进一步对电力系统规划运行的前瞻性与科学性提出更高要求。在此背景下，大模型等人工智能技术凭借强大的多源数据融合、复杂问题建模与智能决策能力，成为破解电力系统核心难题的关键抓手。在电力设备运检领域，大模型等人工智能技术可深度挖掘设备传感数据、巡检图像、历史台账等多元信息，实现设备缺陷的精准识别、寿命周期的智能预测以及极端工况下的风险评估，推动运检模式从“计划检修”向“预知检修”转变，大幅降低运维成本与停电风险。在电网调度运行领域，大模型等人工智能技术能够结合气象、负荷、新能源出力等不确定性因素，开展高精度概率预测，通过鲁棒优化、随机优化等算法生成最优调度策略，高效统筹“源网荷储充”全链条资源，提升系统对新能源的消纳能力，实现故障的快速辨识与处置，保障电网安全稳定运行。本次专题会议聚焦大模型技术在电力设备运检、电网调度运行两大核心场景的前沿应用与技术突破，旨在搭建产学研用交流平台，分享大模型与电力业务深度融合的实践案例，探讨技术落地过程中的关键问题与解决方案。通过推动大模型技术与极端场景风险评估、可再生能源规划、多元业务协同优化等技术的耦合创新，助力电力系统数字化、智能化转型，为实现能源转型目标提供坚实的技术支撑。

英文：

With the acceleration of the energy transition, the power system is evolving into a complex landscape characterized by multi-resource integration, multi-system collaboration, and multi-scenario applicability. The large-scale integration of renewable energy sources such as wind and solar power poses severe challenges to the stability of power supply, while the increasing frequency of extreme weather events further heightens the demand for forward-looking and scientific planning and operation of power systems. Against this backdrop, artificial intelligence technologies, including large language models, have emerged as a key enabler for addressing core challenges in power systems, leveraging their robust capabilities in multi-source data fusion, complex problem modeling, and intelligent decision-making. In the field of power equipment operation and maintenance, large language models and other AI technologies can deeply analyze diverse data sources such as equipment sensor data, inspection images, and historical records to achieve precise defect identification, intelligent prediction of equipment lifecycle, and risk assessment under extreme operating conditions. This facilitates a shift from "scheduled maintenance" to "predictive maintenance," significantly reducing operational costs and outage risks. In the domain of grid dispatch and operation, large language models and AI technologies can incorporate uncertain factors such as weather conditions, load demand, and renewable energy output to conduct high-precision probabilistic forecasting. By employing robust optimization and stochastic optimization algorithms, they generate optimal dispatch strategies, efficiently coordinate resources across the entire "source-grid-load-storage-charging" chain, enhance the system's capacity to absorb renewable energy, and enable rapid fault identification and resolution to ensure the safe and stable operation of the grid. This thematic conference focuses on cutting-edge applications and technological breakthroughs of large language models in two core areas: power equipment operation and maintenance, and grid dispatch and operation. It aims to establish a platform for collaboration among industry, academia, research, and end-users, facilitating the exchange of practical cases on the deep integration of large language models with power sector operations, as well as discussions on key challenges and solutions in the implementation process. By promoting the synergistic innovation of large language models with technologies such as extreme scenario risk assessment, renewable energy planning, and multi-business collaborative optimization, the conference seeks to support the digital and intelligent transformation of power systems and provide robust technical underpinning for achieving energy transition goals.

征稿主题/包括不限于：
电力行业大模型构建和性能评测技术
面向电力行业的多模态 RAG 技术
基于大模型等人工智能的电力设备运检技术
基于大模型等人工智能的新能源功率预测技术
基于大模型等人工智能的电网调度运行技术
基于大模型等人工智能的电力市场运营技术
电力具身智能技术及其应用
... ...

Construction and Performance Evaluation Technologies for Large Models in the Power Industry
Multimodal RAG Technology for the Power Industry
Power Equipment Operation and Inspection Technology Based on Large Models and Other Artificial Intelligence
New Energy Power Forecasting Technology Based on Large Models and Other Artificial Intelligence
Grid Dispatch and Operation Technology Based on Artificial Intelligence Such as Large Models
Power market operation technology based on large models and other artificial intelligence
Power Embodied Intelligence Technology and Its Applications

Special Session Chair(s):

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Organizer's Brief Biography

中文：华北电力大学国家能源发展战略研究院专职研究员、硕士生导师，中国电力技术市场协会储能专委会专家委员、副秘书长，《综合智慧能源》青年编委。主要从事人工智能在电力系统中的应用、电力系统规划与运行、电力市场等方面的研究，主持国家重点研发计划研究任务 1 项、北京社科决策咨询项目 1 项，参与国务院参事室、中国工程院、国家发展和改革委员会、国家能源局、国家电网公司、华电集团等研究项目数十项。发表文章数十篇，20 余份研究报告被中央政治局常委、全国政协、国家能源局、教育部、北京市发改委等国家领导人和部门采纳、接收。获中国华电集团科技进步奖、社会力量奖励等 5 项。

英文：Full time researcher and master's supervisor at the National Institute of Energy Development Strategy Research of North China Electric Power University, expert committee member and deputy secretary-general of the Energy Storage Special Committee of the China Electric Power Technology Market Association, and young editorial board member of "Comprehensive Smart Energy",Mainly engaged in research on the application of artificial intelligence in the power system, power system planning and operation, power market, etc., led one national key research and development plan research task, one Beijing social science decision-making consulting project, and participated in dozens of research projects such as the State Council Counselor's Office, the Chinese Academy of Engineering, the National Development and Reform Commission, the National Energy Administration, the State Grid Corporation of China, and Huadian Group, Published dozens of articles, and over 20

research reports have been adopted and accepted by national leaders and departments such as the Standing Committee of the Central Political Bureau, the National Committee of the Chinese People's Political Consultative Conference, the National Energy Administration, the Ministry of Education, and the Beijing Municipal Development and Reform Commission. Received 5 awards including China Huadian Group Science and Technology Progress Award and Social Power Award.

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英文：Tan Yuanpeng currently serves as a department director in Artificial Intelligence Research Institute, China Electric Power Research Institute Co., Ltd. He holds the title of Senior Professor-level Engineer and Master's Supervisor. Concurrently, he acts as Member of the Artificial Intelligence Technology Subcommittee under the Power System Communications and Cyber Security Technology Committee of IEEE PES, and Member of the Intelligent Inspection Technology Subcommittee under the Substation Technology Committee of IEEE PES.

His research focuses on multi-modal data analysis in the power sector, knowledge graph and graph computing, and the development of industry-specific large models. He has presided over or taken key roles in more than 20 national and corporate-level scientific and technological projects. He has published 30 papers indexed by SCI/EI, filed 101 invention patent applications, authored 4 monographs, and co-compiled 4 international standards as well as 1 national standard. His accolades include 4 first-class industry awards, 3 second-class industry awards, 1 first-class corporate science and technology progress award, and 2 second-class corporate science and technology progress awards.

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Organizer's Brief Biography

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英文：Gan Lei, Deputy Director of the Power Department at the School of Electrical and Power Engineering, Hohai University, Associate Professor, and Master's Supervisor, serves as Deputy Secretary-General of the IEEE PES Technical Committee on Power System Analysis Methods and a Young Editorial Board Member for journals such as *Power Construction*. His research primarily focuses on energy internet, power system planning and operation, and electricity supply-demand interaction. He has led two National Natural Science Foundation projects and a key R&D initiative in Jiangsu Province, while also participating in five national-level projects, including the National Key R&D Program and key projects under the National Natural Science Foundation. To date, he has published over 50 papers, secured more than 20 authorized invention patents and software copyrights, and received one Power Science and Technology Progress Award.