Special Session III

Special Session Basic Information:

专栏题目 **Session Title**	中文：偏振成像技术及其应用 英文：Polarimetric Imaging Technologies and Their Applications

专栏介绍和征稿主题
Introduction and topics

中文： 偏振成像（Polarization Imaging, PI）是一类通过测量与解析光场偏振态（如 Stokes 参数、偏振度、偏振角等）来获取强度/光谱之外信息维度的成像技术。相较于传统成像，偏振信息为散射与反射提供了可区分的观测维度，可用于散射抑制、反射分离、材质/粗糙度表征、目标增强以及在低对比度背景下的目标检测识别。

近年来，偏振成像的发展呈现出两条相互强化的主线：其一，在应用牵引下，系统形态加速走向快照化与实时获取，并与强度、光谱等信息开展多模态协同与融合感知，以适应散射介质、非均匀照明与复杂背景等真实场景对鲁棒性的要求；其二，在方法层面，研究范式正由传统物理模型与解析反演，迈向以数据驱动为核心的深度学习重建与识别，并进一步演进为将成像机理、物理约束嵌入网络结构与训练过程的物理内蕴深度学习。

目前，偏振成像正逐步成为多场景感知重要工具，广泛服务于海洋与水下探测、复杂环境机器视觉、遥感测绘、工业检测与无损评估、生物与生物医学成像等应用场景。

英文： Polarimetric imaging (PI) refers to a class of imaging techniques that obtain an information dimension beyond intensity/spectrum by measuring and analyzing the polarization state of the optical field (e.g., Stokes parameters, degree of polarization, and angle of polarization). Compared with conventional imaging, polarimetric information provides a separable observational dimension for scattering and reflection, enabling scattering suppression, reflection separation, material/roughness characterization, target enhancement, and target detection and recognition under low-contrast backgrounds. In recent years, the development of polarimetric imaging has exhibited two mutually reinforcing main tracks. First, driven by application needs, system architectures are accelerating toward snapshot and real-time acquisition, and are increasingly combined with intensity and spectral cues to enable multimodal collaboration and fusion sensing, meeting robustness requirements in real-world scenarios such as scattering media, non-uniform illumination, and cluttered backgrounds. Second, at the methodological level, the research paradigm is shifting from traditional physics-based models and analytical inversion to data-driven deep learning for reconstruction and recognition, and is further evolving toward physics-embedded deep learning, where imaging mechanisms and physical constraints are incorporated into network architectures and training procedures. At present, polarimetric imaging is gradually becoming an important tool for multi-scenario perception, and has been widely applied in ocean and underwater exploration, machine vision in complex environments, remote sensing and mapping, industrial inspection and non-destructive evaluation, and biological and biomedical imaging.

The core of this session relates to the latest development of polarization imaging and its real-world applications. Submissions are solicited on, but not limited to, the following topics:

- Advances in Polarimetric Imaging Techniques
- Deep learning in Polarimetric Imaging
- Stokes/Mueller Polarimetry
- Physical Modeling and Inverse Reconstruction for Polarimetric Imaging
- Polarimetric Imaging in Scattering Media
- Polarimetric 3D Vision
- Multispectral/Hyperspectral Polarimetric Imaging
- Biomedical and Biological Polarimetric Imaging
- Industrial Inspection and Metrology using Polarization Imaging
- Remote Sensing Polarimetry and Earth Observation Applications

Special Session Chair(s):

姓名 Name	胡浩丰 Haofeng Hu
称谓 Prefix	教授 Professor
部门 Department	海洋科学与技术学院 School of Marine Science and Technology
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Organizer's Brief Biography

中文：胡浩丰，天津大学英才教授、博士生导师、天津大学海洋技术系主任，主要研究方向为偏振成像和海洋光学探测技术。入选国家高层次青年人才计划、自然资源部科技领军人才、天津市杰青、强国青年科学家引领计划、海洋强国青年科学家、全球前2%顶尖科学家榜单、中国科协“青年人才托举工程”、天津市首批“青年人才托举工程”。主持国家重点研发计划青年科学家项目、国家自然科学基金面上项目（3项）等10余项国家级项目。主编学术专著2部，以第一/通讯作者在PhotoniX等期刊发表SCI论文70余篇，其中ESI高被引论文5篇，以第一发明人授权国家发明专利20余项。

英文： Hu Haofeng is a Distinguished Professor, Doctoral Supervisor, and Director of the Department of Marine Technology at Tianjin University. His main research interests focus on polarization imaging and marine optical detection technology. He has been selected into numerous prestigious talent programs, including the National High-Level Young Talent Program, Leading Scientific and Technological Talent of the Ministry of Natural Resources, Tianjin Municipal Outstanding Young Scientist Program, Powerful Nation Young Scientists Leadership Program, Young Scientist in Marine Power Strategy, Top 2% of World's Scientists List, "Young Talent Support Program" of the China Association for Science and Technology, and the first batch of "Young Talent Support Program" in Tianjin. He has presided over more than 10 national-level projects, such as the Young Scientist Project of the National Key R&D Program and 3 General Programs of the National Natural Science Foundation of China. He has edited 2 academic monographs and published over 70 SCI papers as the first/corresponding author in journals including PhotoniX, among which 5 are ESI Highly Cited Papers. Additionally, he has been authorized more than 20 national invention patents as the first inventor.

姓名 Name	穆廷魁 Tingkui Mu
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Organizer's Brief Biography

中文：穆廷魁，西安交通大学物理学院教授、博士生导师、光电信息科学与工程系主任、现代光学研究所所长。主要从事偏振光谱成像与遥感、目标智能检测与识别、大气光学探测与反演等方向的研究工作。先后荣获国家一流课程，陕西省优秀博士论文、教育部学术新人奖、优秀西部科技创新成果奖等荣誉。先后主持国家和省部级项目10余项，发表SCI论文100余篇（ESI单篇高被引170余次），获授权发明专利30余项。担任国际期刊《Computational Imaging and Measurement》副编辑，国内期刊《光学精密工程》《红外与激光工程》编委、陕西省光学学会理事及多个学会委员，曾受邀在国际光学工程学会SPIE“庞加莱”偏振系列高端线上论坛作45分钟英文专题讲座《快照式偏振光谱成像技术》。

英文： Mu Tingkui is a Professor and Ph.D. Supervisor at the School of Physics, Xi'an Jiaotong University, serves as the

Director of the Department of Optoelectronic Information Science and Engineering and the Director of the Institute of Modern Optics. His research primarily focuses on polarization spectral imaging and remote sensing, intelligent target detection and recognition, atmospheric optical detection and inversion, among other areas. He has received numerous honors, including National First-Class Courses, Shaanxi, Shaanxi Provincial Outstanding Doctoral Dissertation Award, the Ministry of Education's Academic Newcomer Award, and the Outstanding Western Science and Technology Innovation Achievement Award. He has led over 10 national and provincial-level projects, published more than 100 SCI-indexed papers (with a single ESI highly cited paper receiving over 170 citations), and obtained more than 30 authorized invention patents. He serves as an Associate Editor for the international journal Computational Imaging and Measurement, an editorial board member for domestic journals such as Optics and Precision Engineering and Infrared and Laser Engineering, a council member of the Shaanxi Optical Society, and a committee member of several academic associations. He was invited to deliver a 45-minute keynote lecture titled "Snapshot Imaging Spectropolarimetry" at the Henri Poincaré Webinar Series on Optical Polarization and Related Phenomena hosted by the International Society for Optics and Photonics (SPIE).

姓名 Name	祁绩 Ji Qi
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Organizer's Brief Biography

中文：祁绩，之江实验室研究专家、研究员，浙江大学博士生导师。主要从事内窥成像与偏振成像研究。浙江省杰出青年基金获得者、浙江省海外高层次人才。作为第一作者或通讯作者在 Nature Biomedical Engineering, Advanced Photonics, Device, Advanced Science，Photonics Research, Biomedical Optics Express 等期刊发表研究论文二十余篇。系列工作被 MIT Technology Review, Advanced Science News 等报道。作为负责人承担国家自然科学基金重大项目课题、国际合作交流项目、青年项目、浙江省尖兵领雁重大研发计划项目、浙江省杰青等多个科研项目。担任 Advanced Photonics Nexus 等期刊编委。获得 Santander Mobility Award, Medical Image Analysis-MICCAI 最佳论文奖。

英文：Qi Ji is a Research Scientist at Zhejiang Lab, PhD Supervisor at Zhejiang University. His main research interests include endoscopic imaging and polarization imaging. He is a recipient of the Distinguished Young Scholars Fund of Zhejiang Province and a High-Level Overseas Talent of Zhejiang Province. As the first author or corresponding author, he has published more than 20 research papers in journals such as Nature Biomedical Engineering, Advanced Photonics, Device, Advanced Science, Photonics Research, and Biomedical Optics Express. His series of work has been reported by MIT Technology Review, Advanced Science News, etc. As a principal investigator, he undertakes several research projects, including key projects of the National Natural Science Foundation of China, NSFC-Royal Society International Exchange Grant, and major R&D programs of Zhejiang Province. He serves as an editorial board member of journals such as Advanced Photonics Nexus. He has received awards including the Santander Mobility Award and the Best Paper Award at Medical Image Analysis (MICCAI).

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Organizer's Brief Biography

中文：李校博，天津大学海洋科学与技术学院英才副教授、博士生导师。其研究方向聚焦于新体制光电探测与先进计算成像领域的理论、算法及应用研究。入选中国科协“青年人才托举工程”、全球前 2%顶尖科学家榜单，荣获中国光学学会王大珩光学奖、天津市优秀博士学位论文等。以第一作者或通讯作者身份在 IEEE Transactions 系列、Information Fusion、Applied Physics Letters、Optics Letters、Optics Express 等国际高水平期刊发表论文 50 余篇，其中 ESI 高被引论文 5 篇，授权中国发明专利 15 项。

英文： Xiaobo Li is a tenured Associate Professor and Ph.D. supervisor at the School of Marine Science and Technology, Tianjin University. His research focuses on the theory, algorithms, and applications of novel opto-electronic sensing paradigms and advanced computational imaging. He has been selected for the China Association for Science and Technology (CAST) “Young Talent Support Program” and has received multiple honors, including recognition on the Global Top 2% Scientists list, the Wang Daheng Optical Award from the Chinese Optical Society, and the Tianjin Outstanding Doctoral Dissertation Award. As first or corresponding author, he has published more than 50 papers in leading international journals such as the IEEE Transactions series, Information Fusion, Applied Physics Letters, Optics Letters, and Optics Express (including five ESI Highly Cited Papers,) and holds 15 granted Chinese invention patents.