**\*"Vision-Assisted 3-D Predictive Beamforming for Green UAV-to-Vehicle Communications"\***

The work of **Jiaqi Zou.** (2023) studies vision-assisted beamforming for UAV-to-vehicle communication. It relies on cameras stemming from UAVs and leverages the abilities of the YOLOv5 deep learning model to detect vehicles, which can be further used in combination with a Sage-Husa filter for trajectory prediction. This prediction of vehicle positions allows 3D beamforming patterns to be designed that prioritize the most relevant opportunities for communication, reducing overhead and energy consumption. The proposed method greatly enhances SINR, energy efficiency, and the overall communication performance compared to that of conventional methods and provides a more practical solution for UAV-to-vehicle networks.

**\*"Integrated Sensing and Communication Aided Dynamic Resource Allocation for Random Access in Satellite Terrestrial Relay Networks"\***

The work of **Bo Zhao** (2023) proposes the Integrated Relative Energy Efficiency (IREE) metric that overcomes key limitations of traditional energy efficiency metrics in emerging 6G wireless networks. Conventional EE metrics are unsuitable for reflecting the form of traffic and varying capacity in 3D SAGIN integrated navigation due to their dynamic features. IREE captures not only non-uniform network capacity and traffic variations but also heterogeneous path-loss effects and 3D SAGIN coverage effectiveness. We extend the basic green trade-offs framework and integrate IREE into it, insisting that energy-efficient strategies have to adjust themselves with different traffic distributions. The paper studies the capacities of IREE, on a technical level related to technologies like Reconfigurable Intelligent Surfaces and SAGIN.

**\*"Deep Learning Aided Two-Stage Multi-Finger Beam Training in Millimeter-Wave Communication"\***

The work of **Yongcheng Liu** (2023) introduces the DL-TSMBT algorithm, designed to enhance beam alignment in millimeter-wave (mmWave) communications. The algorithm employs a two-stage process: in the first stage, a multi-finger beam simultaneously scans multiple directions, and a convolutional neural network (CNN) is used to identify the most promising beams. In the second stage, further training is conducted to refine the beam selection. This approach significantly reduces the training overhead compared to traditional methods, such as exhaustive and hierarchical searches. Additionally, the DL-TSMBT algorithm improves spectrum efficiency and lowers the probability of beam misalignment in high-frequency communication systems, offering better performance in mmWave networks.

**A Novel Energy Efficiency Metric for Next-Generation Green Wireless Communication Network Design**

The work of **Tao Yu.** (2023) focused on introducing a metric named Integrated Relative Energy Efficiency by Tao Yu and co-authors in 2023, which overcomes the limitation of conventional EE metrics within 6G networks. Traditional EE metrics cannot capture the dynamic traffic and capacity variations in the three-dimensional space-air-ground integrated network architecture of 6G. IREE targets capturing non-uniform network capacity and non-uniform traffic variations due to diverse path-loss effects and effectiveness of 3D SAGIN coverage. The authors extend the basic green trade-offs framework to include IREE and show that energy-efficient strategies will have to cope with diverse distributions of traffic in order to realize their full potential. The authors assess the performance of IREE in 6G technologies, including RIS and SAGIN. The results show that an IREE-oriented network design can ensure substantial energy efficiency gains by making network capacity enhancements go hand in glove with evolving wireless traffic demands. This multi-grant-supported research involves institutions in Shanghai, China, and is published in the IEEE Internet of Things Journal.

**Real-Time Sub-THz Link Enabled Purely by Optoelectronics: 90–310 GHz Seamless Operation**

The work of **Efstathios Andrianopoulos. (2023)** presents a real-time sub-THz wireless link operating in the 90-310 GHz range, enabled by optoelectronic technology. The system employs photonic emitters and receivers with photoconductive antennas, achieving error-free transmission over a 1-meter distance while handling QPSK signals at 1.6 G.Baud. The authors demonstrate two scenarios: homodyne, using the same lasers at the transmitter and receiver, and heterodyne, employing optical phase locking to reduce phase noise. Both scenarios achieve error-free operation with stable SNR over 5 minutes. The link’s ultra-broadband performance spans 220 GHz, and the authors propose future transceiver miniaturization through photonic integration technologies.