Grad School Physics Seminar 2026/27

Report of Contributions

Contribution ID : **1** Type : **not specified**

Welcoming talk of the Graduate School Director

Thursday, 1 October 2026 09:15 (20)

Presenter(s) : Prof. SPALIŃSKI, Michał

Contribution ID : **2** Type : **not specified**

Discussion about the goals and organization of the PhD seminar

Thursday, 1 October 2026 09:35 (20)

Presenter(s) : DURKALEC, Anna (National Centre for Nuclear Research); WAGNER, Jakub (National Centre for Nuclear Research); BLUJ, Michal (NCBJ)

Contribution ID : **3** Type : **not specified**

Heavy New Physics and Precise Predictions of Higgs Properties: The Decoupling Renormalization Scheme in the two Higgs doublet model

Thursday, 8 October 2026 09:15 (60)

Precise predictions of Higgs boson observables can be used to constrain models of physics beyond the Standard Model (BSM), particularly in light of the absence of new light particles at the LHC. In models with a heavy BSM scale the choice of renormalization scheme matters as some schemes can result in large one-loop corrections that fail to decouple as the BSM scale grows. In this talk, I will present decoupling renormalization schemes for precise predictions of Higgs boson properties which extends to scales where an effective field theory description breaks down. I will apply the scheme to the two Higgs doublet model highlighting its decoupling properties and better stability at one-loop order compared to other conventional schemes.

Presenter(s) : LANG, Jonas (National Center for Nuclear Research Poland)

Contribution ID : **4** Type : **not specified**

First measurements of Vector Boson Scattering process with Run-3 data collected by the CMS experiment at LHC

Thursday, 15 October 2026 09:15 (60)

In this seminar, I will present the analysis of same-sign WW and WZ boson production in association with two jets in proton-proton collisions at a centre-of-mass energy of $\sqrt{s}$ = 13.6 TeV. The analysis uses data collected by the CMS detector during 2022–2026, corresponding to an integrated luminosity of 308 fb−1. The measurements are performed in the leptonic decay channels $W^{\pm}Z \rightarrow \ell^{\pm}\nu\ell'^{+}\ell'^{-}$ and $W^{\pm}W^{\pm} \rightarrow \ell^{\pm}\nu\ell'^{\pm}\nu$, where $\ell, \ell' = e, \mu$. Both inclusive and differential fiducial cross sections are measured as a function of several kinematic observables. In addition, I will discuss the search for possible effects of physics beyond the Standard Model through nomalous quartic gauge couplings (aQGCs), interpreted within the framework of the Standard Model Effective Field Theory (SMEFT) using dimension-8 oper-
ators. The sensitivity of different kinematic observables to these operators is investigated to identify the most sensitive variables and derive constraints on the corresponding Wilson coefficients. Finally, the dependence of these constraints on the EFT cutoff scale Λ is studied using the clipping technique.

Presenter(s) : GHIMIRAY, Monika

Contribution ID : **5** Type : **not specified**

From Young to Restarted: Investigating Peaked-Spectrum Radio AGN using LoTSS

Thursday, 22 October 2026 09:15 (60)

Peaked-spectrum (PS) radio sources are often associated with young radio active galactic nuclei (AGN), representing an early stage of radio galaxy evolution. However, some PS sources exhibit compact radio emission embedded within much larger, extended radio structures, suggesting that they may represent a new episode of jet activity in systems with a previous evolutionary history. Identifying such sources provides an opportunity to investigate the episodic nature of AGN activity and constrain the duty cycles of radio galaxies.

In this talk, I will present a systematic investigation of PS radio AGN using the LOFAR Two-metre Sky Survey (LoTSS). First, I will discuss our search for extended radio emission around candidate gigahertz-peaked-spectrum (GPS) and megahertz-peaked-spectrum (MPS) sources from the literature using LoTSS. This study identified 30 candidate restarted radio galaxies, including systems with large-scale radio structures extending well beyond their compact PS components. These sources provide a valuable sample for investigating the connection between compact radio activity and the long-term evolution of radio galaxies. Building on this work, I will present an ongoing project to establish a robust census of PS sources using LoTSS, which covers approximately 89% of the northern sky and contains 13.7 million radio sources. By combining radio catalogues across multiple frequencies and applying systematic spectral-selection criteria, we have identified approximately 12,000 PS candidates. Redshifts have been assembled for around half of the sample, enabling further investigation of their physical properties and large-scale radio morphologies. Preliminary results also reveal extended radio emission associated with a significant fraction of these PS samples. Together, these studies provide a foundation for investigating
the evolutionary diversity of PS radio AGN, identifying promising restarted candidates, and developing a statistically robust sample for future population studies.

Presenter(s) : MOHANAN, Anupama