

## コヒーレント光科学セミナーのご案内

インド工科大バラナシ校の Rakesh Kumar Singh 先生が4月29日-5月1日の日程で本学を訪問されます。

ついては下記の要領でセミナーを開催いたします。

単一ピクセルの光検出器を用いたイメージングについてお話し頂きます。

研究室の研究員、学生の皆様もお誘い合わせのうえ、奮ってご参加下さい。

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## Coherent Optical Science Seminar on Information Optics

Date: Thursday, 30 April 2026

Time: 15:00-16:00

Place: Room #803, East 6 Building, UEC

Speaker: Rakesh Kumar Singh

Professor, Indian Institute of Technology (Banaras Hindu University)

Title: Single pixel imaging

Abstract:

Single pixel imaging offers (SPI) significant advantages in low-light imaging or spectra, where it is expensive to deploy the array detector.

The SPI has emerged as an intriguing approach, wherein structured patterns are projected onto the target, and the reflected or transmitted light from the target is collected by a bucket detector [1].

Reconstruction of the target is performed from the correlation between the illumination pattern and the 1D signal measured by a bucket detector [1,2].

The SPI techniques can be categorized based on the illumination strategy, such as random, cosine, Hadamard, and Fresnel zone plate, etc.

Primary emphasis in these works is on the imaging of the amplitude object.

Some attempts have been made to integrate the SPI with the DH for phase imaging using different interferometric geometries [3].

Recently, we have demonstrated that reference-free and iteration-free phase recovery is possible from single-pixel detection [4].

In this talk, we will discuss the basic principles of SPI and how this technology can be applied to phase recovery and in the correlation imaging.

Some of our recent contributions on the single-pixel detector will be discussed in the

context of Ghost imaging and correlation holography [4, 5].

#### References

- [1] G. M. Gibson, S. D. Johnson, M. J. Padgett, "Single-pixel imaging 12 years on: a review," *Opt. Express* 28(19), 28190-28208 (2020).
- [2] R. K. Singh, "Hybrid correlation holography with a single pixel detector," *Opt. Lett.* 42, 2515-2518 (2017).
- [3] L. Martinez-Leon, P. Clemente, Y. Mori, V. Climent, J. Lancis, E. Tajahuerce, "Single-pixel digital holography with phase-encoded illumination," *Opt. Express* 25(5), 4975-4984 (2017).
- [4] T. Karmakar, A.C. Mandal, P. Agrawal, Z. Zalevsky, and R. K. Singh "Modulating incoherence for phase recovery with single-pixel intensity," *Optics & Laser Technology* 189, 112976 (2025).
- [5] R. V. Vinu, Z. Chen, R. K. Singh, and J. Pu, "Ghost diffraction holographic microscopy," *Optica* 7, 1697-1704 (2020).

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