

भौतिकशास्त्र विभाग,
लोकमान्य टिळक भवन,
विद्यानगरी, सांताक्रुझ (पूर्व),
मुंबई - ४०० ०९८ (भारत).
दूरध्वनी : २६५२ ६२५०, २६५३ ३०५१,
२६५४ ३३५८
विस्तारीत क्र. ३५८
टेली फॅक्स : २६५२ २२२२, २६५३ ३०५१
मेल : head.udp@mu.ac.in

University of Mumbai



मुंबई विद्यापीठ

DEPARTMENT OF PHYSICS

Lokmanya Tilak Bhavan,
Vidyanagari, Santacruz (E),
Mumbai - 400 098 (India).

Tel. No. : 2652 6250, 2653 3051,
2654 3358 Ext. 358

Tel Fax : 2652 2222, 2653 3051

e-mail : head.udp@mu.ac.in

website : http://www.mu.ac.in

NOTICE

**Ph.D. Thesis Open Defense (Viva-voce Examination) of
Mr. Siddhesh Satish Padval**

Supervisor: Prof. Anuradha Misra

Title of Thesis: Study of Single Spin Asymmetries in Hadroproduction and Leptoproduction of Prompt Photons

Transverse single spin asymmetries (TSSAs) observed in high energy scattering experiments offer novel ways to understand three dimensional structure of the proton. These SSAs can be explained using transverse momentum dependent factorization of perturbative quantum chromodynamics. In this approach, SSAs are governed by spin-dependent transverse momentum dependent parton distribution functions (TMD PDFs). One of the important TMDs is Sivers function, which encodes the correlation between spin of the proton and orbital motion of partons inside proton. Over the past years, many experimental and theoretical efforts have been made to study quark Sivers function (QSF) but the gluon Sivers function (GSF) still remains poorly studied. In this thesis, we present estimates of TSSAs in prompt photon production in the scattering of unpolarized beams of protons/leptons off transversely polarized proton target and discuss the possibility of using these as a probes to get information about the gluon Sivers function (GSF). We apply generalized parton model (GPM) and color gauge invariant generalized parton model (CGI-GPM) for obtaining the asymmetry. Our predictions indicate that measurement of TSSA in prompt photon production, both in proton-proton and lepton-proton scattering, in the negative rapidity region would be useful for the extraction of GSF. We find that both f-type and d-type GSFs contribute to the asymmetry in proton-proton scattering while only f-type GSF contributes to the asymmetry in lepton-proton scattering in CGI-GPM. These observations will be useful to constrain f-type GSF and to distinguish between the GPM and CGI-GPM.

Date: 25.11.2022

Time : 3:30 pm

Zoom Link: <https://us06web.zoom.us/j/88615985975?pwd=N2Fkc0lxN0tLUG4zUi93QWdRMkxxZz09>

Prof. Anuradha Misra
Research Guide
Department of Physics
University of Mumbai

Prof. Vaishali Bambole
Professor and Head
Department of Physics
University of Mumbai

**Professor & Head
Department of Physics
University of Mumbai**