11:00-, FRI, 15-APR-2022
The 86 KPSI Seminar, QST
A119, KPSI-QST and Web on-line

Scattering from “a space-time grating”

Asymmetric diffraction and Vavilov-Čerenkov radiation

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Scattering is one of the fundamental processes in wave physics. We recognise various objects via the scattered light. It is well-known that the spatial modulation of a medium brings about diffraction patterns when it is illuminated. The diffraction phenomena have been utilised for spectroscopy, microscopy, communication, etc. What happens if we have modulation not only in space but also in time? Since the temporal modulation breaks time-translational symmetry, it could cause those which have no counterpart in static systems. In this seminar, we shall see how to analyse such a spatiotemporally modulated system and what happens there.

References

[1] D. Oue, K. Ding & J. B. Pendry “Calculating spatiotemporally modulated surfaces: A dynamical differential formalism.” *Phys. Rev. A* **104**, 013509 (2021).

[2] D. Oue, K. Ding & J. B. Pendry “Čerenkov radiation in vacuum from a superluminal grating.” *Phys. Rev. Res.* **4**, 013064 (2022).

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略歴

① 2018 年 4 月－2018 年 9 月　物質科学カデットプログラム履修生（大阪大学博士課程在学中）

誘電損失が引き起こす光の異常な運動量角・運動量

[1] D. Oue, “Complex-angle analysis of electromagnetic waves on interfaces.” *J. Phys.: Conf. Ser.* **1220**, 012058 (2019).
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② 2019 年 4 月－2022 年 3 月　中国科学院大学カブリ理論科学研究所招聘研究員

スピン流生成

表面プラズモンを介した光誘発スピン流

[3] D. Oue & M Matsuo “Effects of surface plasmons on spin currents in a thin film system.” *New J. Phys.* **22**, 033040 (2020).
[4] D. Oue & M Matsuo “Electron spin transport driven by surface plasmon polaritons.” *Phys. Rev. B* **101**, 161404 (2020).
[5] D. Oue & M Matsuo “Optically induced electron spin currents in the Kretschmann configuration.” *Phys. Rev. B* **102**, 125431 (2020).
[6] T. J. Wijaya, D. Oue, M. Matsuo, Y. Ito, K. Elphick, H. Uchida, ... & A. Hirohata “Spin Current Generation by a Surface Plasmon Polariton.” *arXiv:2004.12348*. (2020).

慣性効果によるトンネルスピン流発生

[7] D. Oue & M. Matsuo “Motion-induced spin transfer.” *Phys. Rev. B* **105**, L020302 (2022).

光浮揚した極小粒子における Einstein-de Haas 効果

[8] H. Nishikawa, D. Oue & M. Matsuo “Einstein--de Haas fluctuation of a nanoparticle in spin polarized gases.” *arXiv preprint arXiv:2105.14684* (2021).
[9] T. Sato, T. Kato, D. Oue & M. Matsuo “Gyromagnetic bifurcation in a levitated ferromagnetic particle.” *arXiv preprint arXiv:2202.02461* (2022).

③ 2018 年 10 月－2022 年 3 月　President’s PhD scholar（博士課程在学中）

学位：Doctor of Philosophy　Department of Physics, Imperial College London

博士論文 “Dynamical metasurfaces: electromagnetic properties and instabilities”

カシミール効果による金属表面の構造不安定性と周期駆動された誘電体表面における非対称回折とチェレンコフ発光の研究で学位を取得。

[10] K. Ding, D. Oue, C. T. Chan & J. B. Pendry “Casimir-induced instabilities at metallic surfaces and interfaces.” *Phys. Rev. Lett.* **126**, 046802 (2021).
[11] D. Oue, K. Ding & J. B. Pendry “Calculating spatiotemporally modulated surfaces: A dynamical differential formalism.” *Phys. Rev. A* **104**, 013509 (2021).
[12] D. Oue, K. Ding & J. B. Pendry “Čerenkov radiation in vacuum from a superluminal grating.” *Phys. Rev. Res.* **4**, 013064 (2022).