立命館大学幾何学セミナー

来る**12月20日（月）**に立命館大学幾何学セミナーが行われます．みなさまのご参加をお待ちいたしております.

日時：**2021年12月20日（月）16:30〜18:00**

開催方法：Zoomミーティングでの配信いたします．下記のURLより12月19日（日）までにご登録ください．当日お昼ごろまでにZoomミーティングの情報をお知らせいたします.
`https://ritsumei-ac-jp.zoom.us/meeting/register/tJYpdOCtrTOtGNeOxlY6CzvNCdaJGrFjGIA2`

講演者：

岩井 敏洋 氏

(京都大学)

タイトル：

A bulk-edge correspondence through the second Chern number

アブストラクト：

A one-parameter family of semi-quantum Hamiltonians (4×4 traceless Hermitian matrices) admitting the time-reversal symmetry is defined on the product $S^2(r_1) \times S^2(r_2)$ of two-spheres of radii r_1 and r_2, and a corresponding one-parameter family of quantum Hamiltonians (4×4 matrix with entries of the first order operators) is defined by using two sets of angular momentum operators. The semi-quantum Hamiltonian has two doubly degenerate eigenvalues, to which associated are complex rank-two vector (or quaternionic line) bundles. The second Chern number of one eigen-vector bundle is shown to change accompanying the variation in the parameter. The eigenvalues of the quantum Hamiltonian are classified into two classes. One class of eigenvalues are called bulk-state eigenvalues, which form two bands, positive and negative. The other class of eigenvalues are responsible for the band rearrangement, that is, when the parameter runs in the positive direction, some of these eigenvalues go upward and the others downward to cross the zero level, which defines a spectral flow. It is shown that accompanying the change in the control parameter, the change in the second Chern number of the eigen-vector bundle is in one-to-one correspondence to the spectral flow. This is called a bulk-edge correspondence. In addition, the bulk-edge correspondence is shown to hold through the linearization method. The semi-quantum Hamiltonian is linearized at each of the degeneracy points of the eigenvalue and then quantized in terms of the annihilation and creation operators, according to the Poisson structure of the ambient space $\mathbb{R}^3 \times \mathbb{R}^3$ of $S^2(r_1) \times S^2(r_2)$. Then, the bulk-edge correspondence is also shown to hold between the linearized semi-quantum and quantum Hamiltonians. Thus, the bulk-edge correspondence is viewed as a bridge built between differential geometry and quantum mechanics, not Schrödinger but Dirac, through the quantization procedure.

連絡先： 多羅間大輔
（立命館大学理工学部数理科学科，e-mail: `dtarama` [at] `fc.ritsumei.ac.jp`）