

科研費基盤研究(S) 研究集会

モジュライ空間の幾何学と可積分系†

2017年 9月15日(金) ~ 16日(土)

於： 学習院大学，南1号館 301号室

9月15日(金)

13:00–15:00 齋藤政彦(神戸大)

Geometry of moduli spaces of connections and Higgs bundles over curves and Integrable Systems

15:30–17:30 稲場道明(京都大)

Moduli space of parabolic connections, isomonodromic deformation and compactification problem

18:00 – Dinner (discussion)

9月16日(土)

9:30 – 10:30 三田史彦(名古屋大)

An analogue of Dubrovin's conjecture

10:45–12:15 宮地秀樹(大阪大)

Deformation of Riemann surfaces via affine deformations

13:30 – 15:00 光明 新(神戸大) (南4号館 205号室へ移動)

"Chekhov-Mazzocco-Rubtsov: Algebras of quantum monodromy data and decorated character varieties" の紹介

15:00 – 17:00 自由討論

組織委員: 齋藤政彦(神戸大), 細野 忍(学習院大)

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Abstracts

齋藤政彦

Title: Geometry of moduli spaces of connections and Higgs bundles over curves and Integrable Systems

Abstract: This is an introductory talk of geometry of moduli spaces of connections and Higgs bundles and their relation to Integrable Systems. I will start with a summary of constructions of moduli spaces of parabolic connections and singular parabolic Higgs bundles on a smooth projective curve by geometric invariant theory. Next, we will explain about Riemann-Hilbert correspondence from a family of moduli spaces of singular connections to the corresponding moduli spaces of (generalized) monodromy data. An analysis of RH correspondence shows the geometric Painlevé property of isomonodromic differential equations associated to each type of singular connections. Next, I will investigate explicit geometric structures of moduli spaces of parabolic connections and Higgs bundles. On a Zariski dense open set of each moduli space one can define a canonical coordinate system associated to apparent singularities and their duals. The spectral curves for Higgs bundles play essential roles for this explicit geometry. If time permits, we will explain more geometric structures of moduli spaces.

稲場道明

Title: Moduli space of parabolic connections, isomonodromic deformation and compactification problem

Abstract: This talk is a survey on the series of joint work with Katsunori Iwasaki and Masa-Hiko Saito. First I will explain the notion of regular singular parabolic connection on a smooth projective curve and the moduli space of stable parabolic connections. This moduli space is in fact constructed by its embedding to the projective moduli space of parabolic $\Lambda^1 D$ -triples. This embedding gives a compactification of the moduli space of parabolic connections in the case of rank two. On the other hand, there is Simpson's procedure of compactifying the moduli space of connections by adding the projectivized moduli space of Higgs bundles as a boundary locus. In the case of rank two connections on \mathbb{P}^1 with 4 distinct singular points, our compactification gives a resolution of singularities of the Higgs compactification and the compactification is nothing but the Okamoto Painlevé pair. I will also explain the isomonodromic deformation on the moduli space of parabolic connections.

三田史彦

Title: An analogue of Dubrovin's conjecture

Abstract: Dubrovin はミラー対称性予想に基づいて、Fano 多様体の接続層の導来圏が full exceptional collection を持つことと量子コホモロジー環が半単純であることが同値であると予想した。更に量子 D 加群の Stokes 行列が full exceptional collection のオイラー pairing によって与えられることを予想した。これらの予想は Galkin-Golyshev-Iritani によってガンマ予想という形で精密化された。本講演では full exceptional collection を持つとは限らない場合のガンマ予想の類似について述べる。時間が許せば Calabi-Yau 超曲面の量子 D 加群との関係についても言及する。これは京都大学数理解析研究所の社本陽太氏との共同研究に基づく。

宮地秀樹

Title: Deformation of Riemann surfaces via affine deformations

Abstract: An orientable closed surface of negative Euler characteristic admits a singular Euclidean structure, and any singular Euclidean structure defines a complex structure on the surface. In this talk, we consider singular Euclidean structures defined from "generic" holomorphic quadratic differentials on Riemann surfaces, and discuss the deformation of the underlying conformal structures via the deformation of the singular Euclidean structures in the Teichmueller theoretical formulation.

光明 新

Title: "Chekhov–Mazzocco–Rubtsov: Algebras of quantum monodromy data and decorated character varieties"の紹介

Abstract: Riemann–Hilbert 対応は、接続のモジュライ空間から character variety と呼ばれるモノドロミー表現のモジュライ空間への同型写像を与える。Hitchin は、リーマン球面上の高々 1 位の極をもつ接続の場合にこの写像がシンプレクティック同相写像であることを示した。この理論を、一般のリーマン面上の接続に 2 位以上の極を許す場合へ拡張する問題を考える。Chekhov–Mazzocco–Rubtsov は、この論文の中でこの問題の decorated character variety を用いた定式化を行った。この論文について概略を紹介する。

参考文献

- Chekhov–Mazzocco–Rubtsov: Algebras of quantum monodromy data and decorated character varieties(arXiv:1705.01447)
- Chekhov–Mazzocco–Rubtsov: Painlevé; monodromy manifolds, decorated character varieties and cluster algebras (arXiv:1511.03851)