

教授 (Professor)

小林 俊行 (KOBAYASHI Toshiyuki)

A. 研究概要

過去 5 年間で約 1500 ページ (査読付きのものは、約 1400 ページ) の論文を出版した。項目 B ではこの 1 年間の出版論文のみを記載する。研究テーマは次の 5 つに大別される。

1. 無限次元表現の分岐則の理論

筆者の長年のモチーフである「分岐則」に関して、定性的理論から定量的理論に移行する新しいプログラムと予想を提起した [2].

1.A. (定性的理論 1—離散性) 分岐則の離散性の判定条件をカテゴリー \mathcal{O} に対して幾何的に与え [Trans. Group 2012], またユニタリ表現のカテゴリーに対して、Zuckerman 導来関手加群 [Adv. Math. 2012] および極小表現 [10] の場合に離散的な分岐則の生じるケースを分類した。

1.B. (定性的理論 2—有限性) 無限次元表現の分岐則の重複度有限性を与える必要十分条件を与え [Pers. Math. 2014], さらに、松木敏彦氏とその分類を完成した [Transf. Group 2014].

1.C. (定量的理論 1—対称性の破れの局所作用素) 対称性の破れの作用素の系統的な構成法 (F -method) を開発し [Contemp. Math. AMS, 2012], Pevzner, Souček 等と共同で Rankin–Cohen 作用素や Juhl の共形不変な作用素を新証明で再構成し、その一般化を与えた ([3,4,8,11]).

1.D. (定量的理論 2—対称性の破れの分類理論) 簡約リー群の対称性の破れの非局所作用素を完全に記述する最初の成功例を与えた (著書 [13](B. Speh と共同)).

2. 極小表現の大域解析

筆者は、表現論内部の問題意識とは逆の視点で、極小表現とよばれる「小さな無限次元表現」の幾何的モデルを用いた新しい大域解析の可能性を提唱し、以下の研究を行った。

2.A. (フーリエ変換の一般化と変形理論) 二次錐上にフーリエ変換に相当するユニタリ反転変換を決定した (著書 [Memoirs of AMS 1000,2011]). さらに、フーリエ変換の変形を構成し、Hankel 変換, Dunkl 変換, Hermite 半群等を群論的に包括する変形理論を与えた [Comp. Math. 2012].

2.B. (冪零軌道の量子化) 幾何的量子化が難しいと考えられていた (極小) 冪零軌道の量子化を 2 通りの方法で構成した [JFA, 2012].

2.C. (特殊関数) 極小表現から生じる 4 階の微分方程式と、新しい“特殊関数” ([Ramanujan J.

2011]).

2.D. 保型形式への応用 (G. Savin と共同, [9]).

3. 不連続群

筆者の長年のモチーフである「リーマン幾何学の枠組を越えた不連続群」について、初めて、スペクトル理論の構築に踏み込んだ。幾何学的な準備として、離散群の作用の不連続性に関する量的指標を導入し、高次元タイヒミュラー空間上で安定な離散スペクトラムを構成した。チャレン生誕 100 年の招待講演等で発表し (口頭発表 [10]), 長編の論文を [1] で出版した。

4. 非対称空間の大域解析

非対称空間上の大域解析は未知の世界である。その研究の基盤のための理論構築を手がけた。

4.A. 幾何学的群論の手法を推し進め、非対称空間の正則表現が L^p 緩増加となるための必要十分条件を証明した (Y. Benoist と共同 [7]).

4.B. 誘導表現の既約分解における重複度の有限性および一様有界性に関する判定条件を、偏微分方程式系の境界値問題を用いて決定した (大島利雄氏と共同 [Adv. Math. 2013]).

5. 可視的作用と無重複表現

複素多様体における可視的作用という概念を導入し無重複性の伝播定理を証明 (口頭発表 [5]), 無重複表現の統一的な構成を与えた。

1. Analysis on non-symmetric spaces

This is a challenge to the global analysis on homogeneous spaces beyond symmetric spaces.

1.A I introduced a notion of *real spherical manifolds* and established a geometric criterion for finite multiplicities in the induced/restricted representations [Adv. Math. 2013] with T. Oshima,

1.B classified all symmetric pairs that yield finite-multiplicity branching laws in [Trans. Group, 2014].

1.C Jointly with Y. Benoist [7], we proved a criterion for L^p -temperedness of the regular representation on G/H in the generality that $G \supset H$ are pair of reductive groups.

2. Analysis on minimal representations

Minimal representations are one of building blocks of unitary representations. Classic examples are the Weil representation. I proposed a *geometric approach* to minimal representations, by which we could expect a fruitful the-

ory on global analysis by *maximal symmetries*. It includes a conformal construction of minimal representations with B. Ørsted [Adv. Math. 2003]), a theory of *unitary inversion operator* on the L^2 -model that generalizes the Euclidean Fourier transform with G. Mano ([Memoirs of AMS, **1000**, (2011)]), a deformation theory of the Fourier transform in [Compositio Math. 2012], new “special functions” satisfying a certain ODE of *order four* with G. Mano, Hilgert, and Möllers in [Ramanujan J. 2011], and a generalization of the Schrödinger/Fock model [JFA 2012] among others.

3. Multiplicity-free representations

The paper gives a full proof of the propagation theorem of multiplicity-freeness, which produces various multiplicity-free results as synthetic applications of the original theory of *visible actions* on complex manifolds.

4. Discontinuous groups

Developing my continuing motif on discontinuous groups for non-Riemannian homogeneous spaces, I initiated the study on discrete spectrum on locally non-Riemannian symmetric spaces with F. Kassel [1].

5. Restriction of representations

I accomplished the classification of the triple $(\mathfrak{q}, \mathfrak{g}, \mathfrak{h})$ such that Zuckerman’s derived functor modules $A_{\mathfrak{q}}(\lambda)$ decompose discretely with respect to a reductive symmetric pair $(\mathfrak{g}, \mathfrak{h})$ in [Adv. Math. 2012] and also some other small representations in [10] with Y. Oshima. In the BGG category \mathcal{O} , I developed a theory of discretely decomposable restrictions [Transf. Groups 2012], proposed an effective method to find singular vectors (‘ F -method’ [Contemp. Math. AMS, 2013]), and joint with B. Ørsted, V. Souček, P. Somberg, M. Pevzner, and T. Kubo determined explicit formulae of covariant differential operators in various geometric settings ([3,4,8,11]). With B. Speh, I classified symmetry breaking operators of spherical principal series of Lorentz groups [13].

B. 発表論文

1. F. Kassel and T. Kobayashi, “Poincaré series for non-Riemannian locally symmetric spaces”, *Advances in Mathematics*, **287**

(2016), 123–236.

2. T. Kobayashi, “A program for branching problems in the representation theory of real reductive groups”, In: *Representations of Lie Groups, In Honor of David A. Vogan, Jr. on his 60th Birthday*, *Progress in Mathematics* **312**, pp. 277–322. Birkhäuser, 2015.
3. T. Kobayashi and M. Pevzner, “Differential symmetry breaking operators. II. Rankin–Cohen operators for symmetric pairs”, *Selecta Mathematica*. Published OnLine 14 December 2015. 65 pages. DOI: 10.1007/s00029-015-0208-8.
4. T. Kobayashi and M. Pevzner, “Differential symmetry breaking operators. I. General theory and F -method”, *Selecta Mathematica*. Published OnLine 11 December 2015. 45 pages. DOI: 10.1007/s00029-015-0207-9.
5. T. Kobayashi, A. Nilsson, and F. Sato, “Maximal semigroup symmetry and discrete Riesz transforms”, *Journal of the Australian Mathematical Society*. **100**, (2016), pp. 216–240.
6. T. Kobayashi, “Analysis on non-Riemannian locally symmetric spaces – an application of invariant theory”, (eds. S. Naito and K. Naoi), *Proceedings of Symposium on Representation Theory 2015*, held at Izu-Nagaoka, Shizuoka, Japan, November 17-20, 2015, pp. 46–59.
7. Y. Benoist and T. Kobayashi, “Temperedness of reductive homogeneous spaces”, *J. Eur. Math. Soc.*, **17** (2015), 3015–3036.
8. T. Kobayashi, B. Ørsted, P. Somberg, and V. Souček, “Branching laws for Verma modules and applications in parabolic geometry. I”, *Advances in Mathematics*, **285** (2015), 1796–1852.
9. T. Kobayashi and G. Savin, “Global uniqueness of small representations”, *Mathematische Zeitschrift*, **281**, (2015), 215–239.

10. T. Kobayashi and Y. Oshima, “Classification of symmetric pairs with discretely decomposable restrictions of (\mathfrak{g}, K) -modules”. *Crelles Journal*, **2015(703)**, pp. 201–223, 2015.
 11. T. Kobayashi, T. Kubo, and M. Pevzner. Vector-valued covariant differential operators for the Möbius transformation. *Springer Proceedings in Mathematics & Statistics*, **111**, (2015), pp. 67–86.
- 著書.
12. T. Kobayashi, 疑問をおこして考え, そして考え抜く, 小平邦彦 (編)「新・数学の学び方」岩波書店, 2015, pp. 91–115 (分担執筆).
 13. T. Kobayashi and B. Speh, “Symmetry Breaking for Representations of Rank One Orthogonal Groups”, *Mem. Amer. Math. Soc.*, **238**, アメリカ数学会, 2015 年, v+112 pp.
- C. 口頭発表
1. “Analysis on Non-Riemannian Locally Symmetric Spaces —An Application of Invariant Theory”, (**1.A.**–**1.D.** では講演タイトル, 内容は個々に異なるが, 大きなテーマとしては同じなので 1 つにまとめる.) **1.A.** Harmonic Analysis, Group Representations, Automorphic Forms and Invariant Theory: in honour of Roger Howe celebrating his 70th birthday (Howe 教授 70 歳記念研究集会). Yale University, USA, 1-5 June 2015. **1.B.** Seminar. Institut Élie Cartan de Lorraine, Nancy, France, 15 October 2015. **1.C.** Workshop: Branching Laws, Quantum Ergodicity, Wave Front Sets & Resonances (organized by M. Pevzner and P. Ramacher. Reims, France, 23-24 October 2015. (2 lectures). **1.D.** Symposium on Representation Theory 2015, 伊豆長岡, Shizuoka, Japan, 17-20 November 2015.
 2. “Rigidity in geometry and spectral analysis on non-Riemannian locally homogeneous manifolds”, Workshop: Deformation of Discrete Groups and Related Topics. Nagoya University, Nagoya, Japan, 17-18 February 2015.
 3. Branching Laws for Infinite Dimensional Representations of Real Lie Groups. Mathematical Panorama Lectures in celebration of 125th birthday of Srinivasa Ramanujan (ラマヌジャン生誕 125 周年におけるインド数学会年記念のパノラマ・レクチャー, 5 回の連続講義). Tata Institute, India, 18–22 February 2013.
 4. Branching problems of representations of real reductive Lie groups. **4.A.** Representations of reductive groups: (David Vogan 教授還暦記念研究集会) (organized by Roman Bezrukavnikov, Pavel Etingof, George Lusztig, Monica Nevins, and Peter Trapa). MIT, USA, 19-23 May 2014. **4.B.** Representation Theory and Groups Actions. The University of Tokyo, Tokyo, Japan, 12 July 2014. **4.C.** Workshop on New Developments in Representation Theory (opening lecture), Singapore, 14 March 2016.
 5. Visible Actions and Multiplicity-free Representations. XVIth International Conference on Geometry, Integrability and Quantization. Varna, Bulgaria, 6–11 June 2014.
 6. Symmetry Breaking Operators for Rank One Orthogonal Groups. **6.A.** Analysis, Geometry and Representations on Lie Groups and Homogeneous Spaces (河添健教授および Ahmed Intissar 教授の還暦記念研究集会). Marrakech, Morocco, 8-12 December 2014. **6.B.** Symmetry Breaking Operators and Branching Problems. Symposium on Representation Theory 2014. Awajishima, Japan, 25-28 November 2014. (連続講演) **6.C.** Symmetry Breaking Operators and Branching Problems. Algebraic Geometry Seminar. Zurich University, Switzerland, 6 October 2014. **6.D.** Symmetry Breaking Operators for Rank One Orthogonal Groups.

- Prehomogeneous Vector Spaces and Related Topics (organized by Slupinski, Soufai, Y. Hironaka, H. Ochiai; scientific advisors: Rubenthaler and F. Sato). Rikkyo University, Tokyo, Japan, 1–5 September 2014.
7. Geometric Analysis on Minimal Representations. **7.A.** Mathematical Physics and Representation Theory (Igor Frenkel 教授 60 歳記念研究集会) (organized by P. Etingof, M. Khovanov, A. Kirillov Jr., A. Lachowska, A. Licata, A. Savage and G. Zuckerman). Yale University, USA, 12–16 May 2012. **7.B.** International summer research school of CIMPA 2013: Hypergeometric functions and representation theory. Mongolia, 5–16 August 2013. **7.C.** (2 lectures). Analytic Representation Theory of Lie Groups. Kavli IPMU, the University of Tokyo, Japan, 1–4 July 2015. **7.D.** Geometric Quantization of Minimal Nilpotent Orbits. (Souriau 教授 90 歳記念研究集会) Aix-en-Provence, France, 25–29 June 2012.
 8. Natural Differential Operators in Parabolic Geometry and Branching Laws. **8.A.** The Interaction of Geometry and Representation Theory: Exploring New Frontiers (M. Eastwood 60 歳記念研究集会) ESI, Vienna, 10–14 September 2012. **8.B.** Workshop on the Interaction of Representation Theory with Geometry and Combinatorics. Hausdorff Institute, Bonn, Germany, March 2011. **8.C.** Special day on Lie groups. Utrecht University, the Netherlands, May 2011. **8.D.** (2 lectures), Representation Theory XII. Dubrovnik, Croatia, June 2011. **8.E.** Lie Groups: Geometry and Analysis (JSPS/DFG seminar). Paderborn, Germany, September 2011. **8.F.** Symposium on Representation Theory 2012. Kagoshima, Japan, 4–7 December 2012. **8.G.** Workshop on Geometric Analysis on Euclidean and Homogeneous Spaces (S. Helgason 教授 85 歳記念研究集会). Tufts University, USA, January 2012. **8.H.** International Workshop: Lie Theory and Its Applications in Physics (LT-10). Varna, Bulgaria, 17–23 June 2013. **8.I.** Analysis Seminar. Chalmers University of Technology and the University of Gothenburg, Sweden, 14 May 2013. **8.J.** Geometry, Representation Theory, and Differential Equation, Kyushu University, Japan, 26–19 February 2016.
 9. Finite Multiplicity Theorems and Real Spherical Varieties. **9.A.** 松木敏彦教授 還暦記念研究集会. Tottori, Japan, 8–9, February 2014. **9.B.** Representation Theory and Analysis of Reductive Groups: Spherical Spaces and Hecke Algebras Oberwolfach, Germany, 19–25 January 2014. **9.C.** Workshop on Representations of Lie Groups and their Subgroups (organized by G. Zhang). Chalmers University of Technology, Sweden, 19–20 September 2013. **9.D.** Representations of Reductive Groups Salt Lake City, USA, 8–12 July 2013. **9.E.** Group Actions with applications in Geometry and Analysis: in honour of Toshiyuki Kobayashi 50th birthday. Reims, France, 3–6 June 2013. **9.F.** Branching Laws, IMS, Singapore, March, 2012. **9.G.** Harmonic Analysis Seminar. Charles University in Prague, Czech, 14 December 2012. **9.H.** Harmonic Analysis, Operator Algebras and Representations. Centre International de Rencontres Mathématiques (CIRM), Luminy, France, 22–26 October 2012. **9.I.** Special Program “Branching Laws” (11–31 March 2012). Institute for Mathematical Sciences, NUS, Singapore, 19 March 2012. **9.J.** (closing lecture), Lie Groups, Lie Algebras and their Representations (organized by Joseph Wolf). University of California, Berkeley, USA, November 2011. **9.K.** Analysis on Lie Groups. Max Planck Institute for Mathematics, Bonn, Germany, September 2011. **9.L.** (closing lecture), Seminar Sophus Lie. Erlangen, Germany, July 2011.

10. Global Geometry and Analysis on Locally Symmetric Spaces—Beyond the Riemannian Case. **10.A.** (S. S. Chern 生誕 100 周年記念集会). Mathematical Science Research Institute (MSRI) at Berkeley, California, USA, October 2011. **10.B.** Cohomology of Arithmetic Groups (M. S. Raghunathan 教授 70 歳記念研究集会). Tata Institute of Fundamental Research, Mumbai, India, December 2011. **10.C.** JSPS-DST Asian Academic Seminar 2013: Discrete Mathematics & its Applications. the University of Tokyo, Japan, 3–10 November 2013. **10.D.** Sophus Lie Days. Cornell, USA, 11 October 2013. **10.E.** Japan–Netherlands Seminar. Nagoya University, Japan, 26–30 August 2013. **10.F.** Hayama Symposium on Complex Analysis in Several Variables XVI. Kanagawa, Japan, 20–23 July 2013. **10.G.** (2 lectures), Workshop d’analyse harmonique. Reims, France, 2 November 2012. **10.H.** 談話会, Colloquium Lorrain. Université de Lorraine - Metz, France, 16 October 2012. **10.I.** 談話会, University of Chicago, USA, May 2011. **10.J.** 談話会, IPMU, the University of Tokyo, Japan, December 2011. **10.K.** 談話会. Kyushu University, Fukuoka, Japan, 15 January 2015. **10.L.** 談話会. Tohoku University, Sendai, Japan, 15 December 2014. **10.M.** 談話会. The University of Tokyo, Tokyo, Japan, 11 July 2014. **10.N.** Lie Groups: Structure, Actions and Representations (J. Wolf 教授 75 歳記念研究集会). Ruhr-Universität, Bochum, Germany, January 2012. **10.O.** Sophus Lie Days. Cornell, USA, 11 October 2013. **10.P.** Journée Mathématique de la Fédération de Recherche. Logis du Roy, Amiens, France, 2 July 2013. **10.Q.** Colloquium de Mathématiques de Rennes. Institut de Recherche mathématique de Rennes, France, 10 June 2013. **10.R.** Chalmers University of Technology and the University of Gothenburg, 談話会, Sweden, 20 May 2013. **10.S.** Workshop: Deformation of Discrete Groups and Related Topics. Nagoya University, Nagoya, Japan, 17–18 February 2015. **10.T.** The 11th International Workshop: Lie Theory and Its Applications in Physics (LT-11). Varna, Bulgaria, 15–21 June 2015. **10.U.** Kyushu University, 談話会, Fukuoka, Japan, 15 January 2015.
- D. 講義
1. 数理科学概論 I: 微積分, Taylor 展開, 偏微分, 近似と概算, 微分方程式の初歩, 多変数関数の積分を講義し, 約 200 題の演習で講義を補った. (教養学部文科 1, 2 年生)
 2. 数物先端科学 I・幾何学 XF: 対称性の破れ作用素の構成の基礎理論を講義した. その準備として, リー群と等質空間, 多様体上のファイバーバンドルの群作用, 普遍包絡環と Verma 加群の基礎事項を解説し, 微分作用素として表せる対称性の破れ作用素が Verma 加群の分岐則に対応するという双対定理 (Kobayashi–Pevzner) とその応用を紹介した. (数理大学院・4 年生共通講義)
 3. 数学講究 XB (数理科学概説)「幾何学と表現論」, (理学部数学科 4 年生), 2015 年 5 月 13 日.
 4. 数学講究 XA, 数学特別講究, 通年: テキスト “Heat Kernels and Dirac Operators”, および “Automorphic Forms and Representations” (理学部数学科 4 年生)
 5. Berkeley-Tokyo Winter School: Geometry, Topology and Representation Theory, “Branching Problems in representation Theory of Reductive Lie Groups”, Berkeley, アメリカ合衆国, 2016 年 2 月.
 6. リー群の無限次元表現論, 九州大学, 集中講義, 2015 年.
- E. 修士・博士論文
1. (博士) 北川宜稔 (KITAGAWA Masatoshi) Algebraic structure on the space of intertwining operators (絡作用素の空間上の代数構造), 2015 年度

2. (博士) 中濱良祐 (NAKAHAMA Ryosuke) Some topics on analysis of holomorphic discrete series representations (正則離散系列表現の解析に関するいくつかの話題), 2015 年度
 3. (修士) レオンチエフ オレクシイ (Leontiev Oleksii): Study of symmetry breaking operators of indefinite orthogonal groups $O(p, q)$ (不定値直交群 $O(p, q)$ の対称性の破れ作用素の研究), 2015 年度
 4. (修士) 田内大渡 (TAUCHI Taito): 実リー群の軌道と不変超関数の空間の次元について, 2015 年度
 5. (修士) 島本直弥 (SHIMAMOTO Naoya): Description of infinite orbits on multiple flag varieties (多重旗多様体上の無限軌道の記述) 2015 年度
- F. 対外研究サービス
1. Kavli IPMU(数物宇宙連携機構), 上席科学研究員併任 (2009.8–2011.5); 主任研究員 (Principal Investigator) 併任 (2011.6–)
- [ジャーナルのエディター]
2. Managing Editor, Japanese Journal of Mathematics (日本数学会) (2005–)
 3. Editor, International Mathematics Research Notices (Oxford 大学出版) (2002–)
 4. Managing Editor, Takagi Booklet, vol. 1–16 (日本数学会) (2006–)
 5. Editor, Geometriae Dedicata (Springer) (2000–)
 6. Editor, Advances in Pure and Applied Mathematics (de Gruyter) (2008–)
 7. Editor, International Journal of Mathematics (World Scientific) (2004–)
 8. Editor, Journal of Mathematical Sciences, The University of Tokyo (2007–)
 9. Editor, Kyoto Journal of Mathematics (2010–)
 10. Editor, Representation Theory (アメリカ数学会) (2015–)
 11. Editor, Special Issue in commemoration of Professor Kunihiko Kodaira's centennial birthday (J. Math. Sciences, the University of Tokyo) (2015).
 12. Editor, AMS Translation Series (アメリカ数学会) (2016–)
 13. 共立出版, 『共立講座 数学探検 (全 18 巻)』, 『共立講座 数学の魅力 (全 14 巻+別巻 1)』, 『共立講座 数学の輝き (全 40 巻予定)』の 3 シリーズ編集委員
- [学会・他大学の委員など]
14. 審査委員: European Research Council (2010–)
 15. 京都大学数理解析研究所運営委員 (2015–2017)
 16. 京都大学数理解析研究所専門委員 (2007–2009; 2009–2011; 2015–2017)
 17. 科学研究費等の審査委員: 日本 (JSPS), 米国 (NSF-AMS), EU, ドイツ, ルクセンブルク, 中華人民共和国・香港 (various years)
 18. 審査委員: Prize Committee 日本数学会春季賞・秋季賞他 (anonymous) (various years)
 19. Jury, Doctor of Philosophy, Utrecht University, the Netherlands (2011)
- [国際研究集会のオーガナイザーなど]
20. Scientific Committee, Visible Actions and Multiplicity-free Representations. XVIIth International Conference on Geometry, Integrability and Quantization. Varna, Bulgaria, 2016.
 21. オーガナイザー, Winter School 2016 on Representation Theory of Real Reductive Groups, 東京大学大学院数理科学研究科, 22–27 January 2016. Coorganized with Toshihisa Kubo and Hideko Sekiguchi.
 22. オーガナイザー, Analytic representation theory of Lie groups, 1–4 July 2015, Kavli 数物連携宇宙研究機構, 東京大学.

23. オーガナイザー, Winter School 2015 on Representation Theory of Real Reductive Groups, 東京大学大学院数理科学研究科, 24–26 January 2015. Coorganized with Toshihisa Kubo, Hisayosi Matumoto and Hideko Sekiguchi.
24. オーガナイザー, Winter School on Representation Theory of Real Reductive Groups, 東大, 15–18 February 2014, (with T. Kubo, H. Matumoto and H. Sekiguchi).
25. オーガナイザー, Session “Representation Theory” in JSPS-DST Asian Academic Seminar 2013: Discrete Mathematics & Its Applications (小谷元子他), the University of Tokyo, Japan, 7 November, 2013.
26. オーガナイザー, Representations of Lie Groups and Supergroups, Oberwolfach, Germany, 10–16 March 2013 (with J. Hilgert, K.-H. Neeb and T. Ratiu)
27. Scientific committee, Harmonic Analysis, Operator Algebras and Representations, CIRM, Luminy, France, 21–26 October 2012
28. オーガナイザー, Branching Problems for Unitary Representations, Max Planck Institute for Mathematics Bonn, Germany, 25–29 July 2011 (with B. Ørsted and B. Spéh)
29. Scientific committee, Recent Developments in Harmonic Analysis and their Applications, Marrakech, Morocco, 25–29 April 2011
30. オーガナイザー, 高木レクチャー, 第9回 (京都大学数理研, 2011年6月), 第10回 (京都大学数理研, 2012年5月), 第11回 (東京大学, 2012年11月), 第12回 (東京大学, 2013年5月), 第13回 (京都大学数理研, 2013年11月), 第14回 (東京大学, 2014年5月), 第15回 (東北大学, 2015年6月), 第16回 (東京大学, 2015年11月) (with Y. Kawahigashi, H. Nakajima, K. Ono and T. Saito)
31. オーガナイザー, リー群論・表現論セミナー (2007–present 東大; 2003–2007 RIMS; 1987–2001 東大)

G. 受賞

- 2015 JMSJ 論文賞 (The JMSJ Outstanding Paper Prize) 「極小表現の構成に関する論文 Minimal representations via Bessel operators」に関して」(J. Hilgert, J. Möllers との共同受賞)
- 紫綬褒章 (Medal with Purple Ribbon)(2014) 数学研究
- 井上學術賞 (Inoue Prize for Science) (2011) 「無限次元の対称性の解析」(Analysis on infinite dimensional symmetries)

H. 海外からのビジター

- Shing-Tung Yau, Harvard University, USA, Nov. 27-30, 2015, delivered the Takagi Lectures on the occasion of Kodaira’s 100th birthday.
- Birgit Spéh, Cornell University, USA, Nov. 16-Dec. 15, 2015, visiting professor, gave a series of lectures on automorphic forms and organized seminar.
- Paul Baum, Penn State University, USA, Jul. 2015, visiting professor, gave a series of lectures on index theory and K-homology.
- Anatoly Vershik, St. Petersburg State University, USA, Jun. 29-30, 2015, delivered the Takagi lectures, and gave talks at IPMU workshop and at U. Tokyo.
- Bent Ørsted, オーフス大学, Denmark, Apr. 1-Jul. 10, 2015, visiting professor (category III), gave a series of lectures for one semester on heat kernels and index theory. Professor Ørsted also gave a series of talks at IPMU workshop at the Lie group and representation seminar, and at the colloquium of U. Tokyo.

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