Proceedings of the 44th Symposium on Ring Theory and Representation Theory

September 25(Sun.) - 27(Tue.), 2011
Okayama University, Japan

Edited by
Osamu Iyama
Nagoya University

March, 2012
Nagoya, JAPAN

第４４回 環論および表現論シンポジウム報告集

２０１１年9月２５日（日）－２７日（火）
岡山大学理学部

編集:　伊山修 (名古屋大学)

２０１２年3月
名古屋大学

Organizing Committee of The Symposium on Ring Theory and Representation Theory

The Symposium on Ring Theory and Representation Theory has been held annually in Japan and the Proceedings have been published by the organizing committee. The first Symposium was organized in 1968 by H.Tominaga, H.Tachikawa, M.Harada and S.Endo. After their retirement, a new committee was organized in 1997 for managing the Symposium and committee members are listed in the web page

http://fuji.cec.yamanashi.ac.jp/~ring/h-of-ringsymp.html.

The present members of the committee are H.Asashiba (Shizuoka Univ.), S.Ikehata (Okayama Univ.), S.Kawata (Osaka City Univ.), M.Sato (Yamanashi Univ.) and K.Yamagata (Tokyo Univ. of Agriculture and Technology).

The Proceedings of each Symposium is edited by program organizer. Anyone who wants these Proceedings should ask to the program organizer of each Symposium or one of the committee members.

The Symposium in 2012 will be held at Shinshu University for Sep. 7(Fri.)–9(Sun.) and the program will be arranged by K.Koike (Okinawa National College of Tech.).

Concerning several information on ring theory and representation theory of group and algebras containing schedules of meetings and symposiums as well as ring mailing list service for registered members, you should refer to the following ring homepage, which is arranged by M.Sato (Yamanashi Univ.):

http://fuji.cec.yamanashi.ac.jp/~ring/ (in Japanese)
(Mirror site: www.cec.yamanashi.ac.jp/~ring/)

http://fuji.cec.yamanashi.ac.jp/~ring/japan/ (in English)

Masahisa Sato
Yamanashi Japan
December, 2011

CONTENTS

Preface vii

Program (Japanese) viii

Program (English) xi

Tilting modules arising from two-term tilting complexes
Hiroki Abe 1

Dimensions of derived categories
Takuma Aihara 6

Quiver presentations of Grothendieck constructions
Hideto Asashiba, Mayumi Kimura 16

The Loewy length of tensor products for dihedral two-groups
Erik Darpö, Christopher C. Gill 23

Example of categorification of a cluster algebra
Laurent Demonet 30

Hochschild cohomology of cluster-tilted algebras of types $\mathbb{A}_n$ and $\mathbb{D}_n$
Takahiko Furuya, Takao Hayami 43

Derived autoequivalences and braid relations
Joseph Grant 50

n-representation infinite algebras
Martin Herschend 55

On a degeneration problem for Cohen-Macaulay modules
Naoya Hiramatsu 60

Weak Gorenstein dimension for modules and Gorenstein algebras
Mitsuo Hoshino, Hirotaka Koga 68

On Ω-perfect modules and sequences of Betti numbers
Otto Kerner, Dan Zacharia 76

Quantum unipotent subgroup and dual canonical basis
Yoshiyuki Kimura 92

Weakly closed graph
Kazunori Matsuda 99

Polycyclic codes and sequential codes
Manabu Matsuoka 106

A note on dimension of triangulated categories
Hiroyuki Minamoto 111

APR tilting modules and quiver mutations
Yuya Mizuno 114

The example by Stephens
Kaoru Motose 121

Hom-orthogonal partial tilting modules for Dynkin quivers
Hiroshi Nagase, Makoto Nagura 125

The Noetherian properties of the rings of differential operators on central 2-arrangements
Norihiro Nakashima 132

Hochschild cohomology of quiver algebras defined by two cycles and a quantum-like relation
Daiki Obara 136

Alternative polarizations of Borel fixed ideals and Eliahou-Kervaire type resolution
Ryota Okazaki, Kohji Yanagawa 143

Sharp bounds for Hilbert coefficients of parameters
Kazuho Ozeki 154

Preprojective algebras and crystal bases of quantum groups
Yoshihisa Saito 165

Matrix factorizations, orbifold curves and mirror symmetry
Atsushi Takahashi 196

On a generalization of costable torsion theory
Yasuhiko Takehana 208

Graded Frobenius algebras and quantum Beilinson algebras
Kenta Ueyama 216

Applications of finite Frobenius rings to the foundations of algebraic coding theory
Jay A. Wood 223

Realizing stable categories as derived categories
Kota Yamaura 246

Algebraic stratifications of derived module categories and derived simple algebras
Dong Yang 256

Recollements generated by idempotents and application to singularity categories
Dong Yang 262

Introduction to representation theory of Cohen-Macaulay modules and their degenerations
Yuji Yoshino 268

Subcategories of extension modules related to Serre subcategories
Takeshi Yoshizawa 282

Preface

The 44th Symposium on Ring Theory and Representation Theory was held at Okayama University on September 25th - 27th, 2011. The symposium and this proceeding are financially supported by

Kunio Yamagata (Tokyo University of Agriculture and Technology)
Grant-in-Aid for Scientific Research (B), No.21340003, JSPS,
Kazutoshi Koike (Okinawa National College of Technology)
Grant-in-Aid for Scientific Research (C), No.23540064, JSPS,
Yoshitomo Baba (Osaka Kyouiku University)
Grant-in-Aid for Scientific Research (C), No.23540047, JSPS,
Shuichi Ikehata (Okayama University)
Grant-in-Aid for Scientific Research (C), No.23540049, JSPS,
Shigeto Kawata (Osaka City University)
Grant-in-Aid for Scientific Research (C), No.23540054, JSPS,
Tsunekazu Nishinaka (Okayama Shoka University)
Grant-in-Aid for Scientific Research (C), No.23540063, JSPS.

We would like to thanks Professors Hideto Asashiba, Shuichi Ikahata, Shigeto Kawata, Masahisa Sato and Kunio Yamagata for their helpful suggestions concerning the symposium. Finally we would like to express our thanks to Professors Akihiko Hida and Shuichi Ikahata for their great effort and preparation to hold the symposium in Okayama University.

Masahisa Sato
Yamanashi
December, 2011

第４４回 環論および表現論シンポジウム
プログラム

９月２５日（日）

8:40–9:30 Dan Zacharia（Syracuse University）
On modules of finite complexity over selfinjective algebras I

9:40–10:30 Dong Yang
On derived simple algebras

10:50–11:40 斉藤 義久（東京大学）
前射影多元環と量子群の結晶基底 I

13:00–13:40
21 教室 阿部 弘樹（筑波大学）
Tilting modules arising from two-term tilting complexes
24 教室 Erik Darpö（名古屋大学）
The representation rings of the dihedral 2-groups

13:50–14:30
21 教室 水野 有哉（名古屋大学）
APR tilting modules and quiver mutations
24 教室 小原 大樹（東京理科大学）
Hochschild cohomology of quiver algebras defined by two cycles and a quantum-like relation

14:50–15:30
21 教室 Joseph Grant（名古屋大学）
Derived autoequivalences and braid relations
24 教室 古谷 貴彦・速水 孝夫（東京理科大学・北海学園大学）
Hochschild cohomology of cluster-tilted algebras of types A_n and D_n

15:40–16:20
21 教室 Martin Herschend（名古屋大学）
n-representation infinite algebras
24 教室 吉澤 毅（岡山大学）
Subcategories of extension modules related to Serre subcategories

16:40–17:30 吉野 雄二（岡山大学）
Cohen-Macaulay 加群の表現およびその退化への入門 I

17:40–18:30 Jay A. Wood（Western Michigan University）
Applications of finite Frobenius rings to algebraic coding theory I

９月２６日（月）

8:40–9:30 Dan Zacharia（Syracuse University）
On modules of finite complexity over selfinjective algebras II

9:40–10:30 Dong Yang
Recollements generated by idempotents

10:50–11:40 斉藤 義久（東京大学）
前射影多元環と量子群の結晶基底 II

13:00–13:40
21 教室 竹花 靖彦（函館工業高専）
A generalization of costable torsion theory
24 教室 源 泰幸（京都大学）
A note on dimension of triangulated categories

13:50–14:30
21 教室 木村 真弓・浅芝 秀人（静岡大学）
Quiver presentations of Grothendieck constructions
24 教室 相原 琢磨・高橋 亮（千葉大学・信州大学）
Dimensions of derived categories

14:50–15:30
21 教室 上山 健太（静岡大学）
Graded Frobenius algebras and quantum Beilinson algebras
24 教室 古賀 寛尚・星野 光男（筑波大学）
Weak Gorenstein dimension for modules and Gorenstein algebras

15:40–16:20
21 教室 松岡 学（四日市高校）
Polycyclic codes and sequential codes
24 教室 平松 直哉（呉高専)
On a degeneration problem for Cohen-Macaulay modules

16:40–17:30 吉野 雄二（岡山大学）
Cohen-Macaulay 加群の表現およびその退化への入門 II

17:40–18:30 Jay A. Wood（Western Michigan University）
Applications of finite Frobenius rings to algebraic coding theory II

19:00– 懇親会

９月２７日（火）

8:40–9:30 高橋 篤史（大阪大学）

Matrix Factorizations, Orbifold Curves And Mirror Symmetry

9:40–10:30 宮地 兵衛（名古屋大学）

Hidden Hecke Algebras and Koszul Duality

10:50–11:30

21 教室 山浦 浩太（名古屋大学）

Tilting theory for stable graded module categories over graded self-injective algebras

24 教室 中島 規博（北海道大学）

The Noetherian properties of the rings of differential operators on central 2-arrangements

12:50–13:30

21 教室 長瀬 潤・名倉 誠（東京学芸大学・奈良高専）

Hom-orthogonal partial tilting modules for Dynkin quivers

24 教室 岡崎 亮太・柳川 浩二（大阪大学・関西大学）

Alternative polarizations of Borel fixed ideals and Eliahou-Kervaire type resolution

13:40–14:20

21 教室 Laurent Demonet（名古屋大学）

Categorification of cluster algebra structures of coordinate rings of simple Lie groups

24 教室 松田 一徳（名古屋大学）

Weakly closed graph

14:40–15:20

21 教室 木村 嘉之（京都大学）

Quantum unipotent subgroup and dual canonical basis

24 教室 大関 一秀（明治大学）

Sharp bounds for Hilbert coefficients of parameters

15:30–16:20 本瀬 香

The Example by Stephens

The 44th Symposium On Ring Theory and Representation Theory (2011)

Program

Sunday September 25

8:40–9:30 Dan Zacharia (Syracuse University)
On modules of finite complexity over selfinjective algebras I

9:40–10:30 Dong Yang
On derived simple algebras

10:50–11:40 Yoshihisa Saito (University of Tokyo)
Preprojective algebras and crystal bases of quantum groups I

13:00–13:40

Room 21 Hiroki Abe (University of Tsukuba)
Tilting modules arising from two-term tilting complexes

Room 24 Erik Darpö (Nagoya University)
The representation rings of the dihedral 2-groups

13:50–14:30

Room 21 Yuya Mizuno (Nagoya University)
APR tilting modules and quiver mutations

Room 24 Daiki Obara (Tokyo University of Science)
Hochschild cohomology of quiver algebras defined by two cycles and a quantum-like relation

14:50–15:30

Room 21 Joseph Grant (Nagoya University)
Derived autoequivalences and braid relations

Room 24 Takahiko Furuya, Takao Hayami (Tokyo University of Science, Hokkai-Gakuen University)
Hochschild cohomology of cluster-tilted algebras of types A_n and D_n

15:40–16:20

Room 21 Martin Herschend (Nagoya University)
n-representation infinite algebras

Room 24 Takeshi Yoshizawa (Okayama University)
Subcategories of extension modules related to Serre subcategories

16:40–17:30 Yuji Yoshino (Okayama University)
Introduction to reresentations of Cohen-Macaulay modules and their degenerations I

17:40–18:30 Jay A. Wood (Western Michigan University)
Applications of finite Frobenius rings to algebraic coding theory I

Monday September 26

8:40–9:30 Dan Zacharia (Syracuse University)
On modules of finite complexity over selfinjective algebras II

9:40–10:30 Dong Yang
Recollements generated by idempotents

10:50–11:40 Yoshihisa Saito (University of Tokyo)
Preprojective algebras and crystal bases of quantum groups II

13:00–13:40

Room 21 Yasuhiko Takehana (Hakodate National College of Technology)
A generalization of costable torsion theory

Room 24 Hiroyuki Minamoto (Kyoto University)
A note on dimension of triangulated categories

13:50–14:30

Room 21 Mayumi Kimura, Hideto Asashiba (Shizuoka University)
Quiver presentations of Grothendieck constructions

Room 24 Takuma Aihara, Ryo Takahashi (Chiba University, Shinshu University)
Dimensions of derived categories

14:50–15:30

Room 21 Kenta Ueyama (Shizuoka University)
Graded Frobenius algebras and quantum Beilinson algebras

Room 24 Hirotaka Koga, Mitsuo Hoshino (University of Tsukuba)
Weak Gorenstein dimension for modules and Gorenstein algebras

15:40–16:20

Room 21 Matsuoka Manabu (Yokkaichi Highschool)
Polycyclic codes and sequential codes

Room 24 Naoya Hiramatsu (Kure National College of Technology)
On a degeneration problem for Cohen-Macaulay modules

16:40–17:30 Yuji Yoshino (Okayama University)
Introduction to reresentations of Cohen-Macaulay modules and their degenerations II

17:40–18:30 Jay A. Wood (Western Michigan University)
Applications of finite Frobenius rings to algebraic coding theory II

19:00– Conference dinner

Tuesday September 27

8:40–9:30 Atsushi Takahashi (Osaka University)
Matrix Factorizations, Orbifold Curves And Mirror Symmetry

9:40–10:30 Hyohe Miyachi (Nagoya University)
Hidden Hecke Algebras and Koszul Duality

10:50–11:30

Room 21 Kota Yamaura (Nagoya University)
Tilting theory for stable graded module categories over graded self-injective algebras

Room 24 Nakashima Norihiro (Hokkaido University)
The Noetherian properties of the rings of differential operators on central 2-arrangements

12:50–13:30

Room 21 Hiroshi Nagase, Nagura, Makoto (Tokyo Gakugei University, Nara National College of Technology)
Hom-orthogonal partial tilting modules for Dynkin quivers

Room 24 Ryota Okazaki, Kohji Yanagawa (Osaka University, Kansai University)
Alternative polarizations of Borel fixed ideals and Eliahou-Kervaire type resolution

13:40–14:20

Room 21 Laurent Demonet (Nagoya University)
Categorification of cluster algebra structures of coordinate rings of simple Lie groups

Room 24 Kazunori Matsuda (Nagoya University)
Weakly closed graph

14:40–15:20

Room 21 Yoshiyuki Kimura (Kyoto University)
Quantum unipotent subgroup and dual canonical basis

Room 24 Kazuho Ozeki (Meiji University)
Sharp bounds for Hilbert coefficients of parameters

15:30–16:20 Kaoru Motose
The Example by Stephens