Spring Workshop 2014

on Low-Dimensional Topology and its Ramifications

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- 14:00-14:05 Openning

- 14:10-14:50   M2
  On Alexander invariant of rational homology fibered knot

- 15:20-15:50   D1
  Definition of finite type invariants of connected oriented compact 3-*manifolds, and Qundle homotopy (cocycle) invariants*

- 16:20-16:50   M1   [M1   ]
  Covering linkage invariants of Brunnian links and their Milnor invariants

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- 10:30-12:00
  Arithmetic topology for moduli of Galois representations

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                  M1
  Non-left-orderable surgeries and presentations of knot groups

- 15:00-16:30   OCAMI
  Bridge genus and braid genus for 3-*manifolds*

- 16:30-17:30

- 18:00-

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- 10:30-12:00   D2
  The Γ-polynomial of a knot and its applications

- 14:00-16:30 Jean-Baptiste Meilhan Institut Fourier, Universite Grenoble I
  Homotopy classification of welded and ribbon 2-string links

- 16:30-16:35 Closing

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- 14:05-14:50　　　　　　　　　　　　　　　M2

  On Alexander invariant of rational homology fibered knot

  In this talk, we define a class of knots which is called rational homology fibered knot by using rational homology, and study Alexander invariants of them. We further define the monodromies of ratioanal homology fiber surfaces, and see how they are related to the Alexander invariants. We also see that there is a decomposition of monodromy corresponding to mutually disjoint, rational homology fiber surfaces for a knot. We show some examples of such decomposition of monodromy.

- 15:20-15:50　　　　　　　　　　　　　　　D1

  Definition of finite type invariants of connected oriented compact 3-manifolds, and Qundle homotopy (cocycle) invariants

  We obtain a finite type invariant of connected oriented compact 3-manifolds. The domain of 3-manifolds is larger than the integral homology 3-spheres of LMO invariant. However, this invariant induces the homology of 3-manifold, and we give a filtration to the domain of mapping class groups.

- 16:20-16:50　　　　　　　　　　　　M1　[　　　　　　　　　　　　M1　　　　　　]

  Covering linkage invariants of Brunnian links and their Milnor invariants

  Let L be an $(n + 1)$-component Brunnian link in 3-sphere S^3 and K a component of L. Then the double branched cover of S^3 branched over K is still S^3. In particular each lift of $L \setminus K$ is an n-component Brunnian link. We show that the Milnor invariants of length $n + 1$ for the link L is modulo-2 congruent to a sum of Milnor invariants of length n for lifts of $L \setminus K$. (This is a joint work with Natsuka Kobayashi.)

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- 10:30-12:00

  Arithmetic topology for moduli of Galois representations

  Arithmetic topology is a study that views 3-dimensional topology and algebraic number theory as analogies from the viewpoint of group theory and Galois theory, which have appeared recently in the classification of mathematics. That fundamental concept is based on analogies between knots and prime numbers. In this talk, we discuss an analogy between moduli of representations of knot groups and Galois groups.

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  Non-left-orderable surgeries and presentations of knot groups

  I will talk about non-left-orderable surgeries on knots. A Dehn surgery is called a non-left-orderable surgery if it yields a closed 3-manifold with non-left-orderable fundamental group. I found presentations of knot groups which make possible to have a non-left-orderable surgery for a given knot in the 3-sphere. This result gives an extention of Nakae's result.

- 15:00-16:30 OCAMI

  Bridge genus and braid genus for 3-manifolds

  The bridge genus and the braid genus are invariants of a closed connected orientable 3-manifold M which are introduced by A. Kawauchi. The bridge genus $g_{\text{bridge}}(M)$ (resp. the braid genus $g_{\text{braid}}(M)$) of M is the minimal number of bridge(L) (resp. braid(L)) for any L such that M is obtained by the 0-surgery of S^3 along a link L. In this talk, we calculate the bridge genus and braid genus for some 3-manifolds.

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- 10:30-12:00 D2

  The Γ-polynomial of a knot and its applications

  The Γ-polynomial is an invariant of an oriented link in the 3-sphere, which is contained in both the HOMFLYPT and Kauffman polynomials as their common zeroth coefficient polynomial. As applications of the Γ-polynomial, I will talk about the following topics:

  (1) On the arc index of cable knots (joint with Hwa Jeong Lee, KAIST)
  (2) On the braid index of Kanenobu knots
  (3) On the arc index of Kanenobu knots (joint with Hwa Jeong Lee, KAIST)
  (4) On the cable Γ-polynomials of mutant knots

- 14:00-16:30 Jean-Baptiste Meilhan Institut Fourier, Universite Grenoble I

  Homotopy classification of welded and ribbon 2-string links

  "Ribbon 2-knotted surfaces" are locally flat embeddings of surfaces in 4-space which bound immersed 3-manifolds with only ribbon singularities. These objects also appear as topological realizations of "welded knotted objects", which is a natural quotient of virtual knot theory.

  In this talk, we consider ribbon tubes, which are knotted annuli bounding ribbon 3-balls. We will see how ribbon tubes naturally act on the reduced free group, and that this action classifies ribbon tubes up to homotopy, that is, when allowing each tube component to cross itself. At the combinatorial level, this provides a classification of welded string links up to self-virtualization, and the above-mentionned action on the reduced free group can be seen as the "virtual extension" of Milnor invariants. This generalizes a result of Habegger and Lin on string links.

  This talk is based on a joint work with B. Audoux, P. Bellingeri and E. Wagner. It is addressed to non-specialists, an will in particular review all the background notions for the results.