ERCIM "ALAIN BENSOUSSAN"
FELLOWSHIP PROGRAMME

ERCIM
European Research Consortium
for Informatics and Mathematics

Scientific Report

First name / Family name	RACHAEL BOYD
Nationality	UK
Name of the *Host Organisation*	NTNU
First Name / family name of the *Scientific Coordinator*	MARKUS SZYMIK
Period of the fellowship	01/06/2018 to 31/08/2019

I – SCIENTIFIC ACTIVITY DURING YOUR FELLOWSHIP

I wrote my thesis into two papers, and greatly strengthened the result of one of these papers.

I started a project with my mentor Markus Szymik, in line with project 1 in the Research Training Programme.

I organised a conference – Knots and Braids in Norway, which brought together people with varying points of view who are interested in knots and braids. There was a school aimed at Ph.D. students and covering algebraic aspects and moduli spaces of knots, and a workshop with glimpses into current research directions.
https://sites.google.com/view/knots-and-braids-in-norway

I started two collaborative research projects: one with Corey Bregman (Brandeis) and one with Richard Hepworth (Aberdeen).

II – PUBLICATION(S) DURING YOUR FELLOWSHIP

-Homological stability for Artin monoids - arXiv number 1808.07722 – pending

We prove that certain sequences of Artin monoids containing the braid monoid as a submonoid satisfy homological stability. When the $K(\pi,1)$ conjecture holds for the associated family of Artin groups this establishes homological stability for these groups. In particular, this recovers and extends Arnol'd's proof of stability for the Artin groups of type A, B and D.

-Low dimensional homology of finite rank Coxeter groups - arXiv number 1811.00400 - pending

We give formulas for the second and third integral homology of an arbitrary finitely generated Coxeter group, solely in terms of the corresponding Coxeter diagram. The first of these calculations refines a theorem of Howlett, while the second is entirely new and is the first explicit formula for the third homology of an arbitrary Coxeter group.

III – ATTENDED SEMINARS, WORKHOPS, CONFERENCES

Invited talks:
- Seminar, Institute of Mathematics of Polish Academy of Sciences, Warsaw - 29th May 2019
- Topology Seminar, University of Newcastle -19th February 2019
- KCL/UCL Junior Geometry Seminar, Imperial College London -31st January 2019
- Topology Seminar, Universite de Bourgogne, Dijon - 18th October 2018
- Topology Semniar, Universite de Strasbourg - 16th October 2018
- British Topology Meeting, The Open University, Milton Keynes - 4th-6th September 2018

Contributed talks

- Manifolds, Isaac Newton Institute, Cambridge - 3rd-7th December 2018
- GdR de Topologie Alg´ebrique, l'Universit´e de Montpellier - 23rd-26th October 2018
- Young Topologists Meeting 2018, University of Copenhagen - 4th-8th July 2018
- International Conference on Manifolds, Groups and Homotopy, Sabhal M`or Ostaig, Isle of Skye - 18th-23rd June 2018

Conferences attended
- Oberwolfach workshop in Topologie – 2nd-7th July 2018

IV – RESEARCH EXCHANGE PROGRAMME (REP)

Name of the REP Organisation: University of Warsaw
Country: Poland
Department: Institute of Mathematics
Local scientific coordinator: Andrzej Weber
Dates: 24/05/2019 to 30/05/2019

I participated in the Simons semester *Geometric and Analytic Group Theory* organized by IMPAN, and gave a seminar.