

INFTY Exchange Grant Report

Visit to University of Barcelona

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1 Visit Purpose

The purpose of the three week visit was to confer with Barcelona set theorists on set theoretical aspects of my project concerning the model theory of structures with quasi-amorphous domains, and the construction of a non-abelian quasi-amorphous group¹. In particular, I planned to confer with Joan Bagaria and other local experts in forcing techniques, and to study papers [Bre93a, Bre93b, Bre90] to see if any existing knowledge about forcing and non-abelian groups can be applied in my context.

2 Work Carried Out

During the three weeks I spent in Barcelona, I did the following:

- I familiarized local set theorists and model theorists with my work by giving a seminar, and also through private discussions.
- I acquired and read the obscure paper [Bre93a], as well as the papers [Bre93b, Bre90].
- I studied the case of amorphous sets not of projective type (see [Tru95]), a case about which little is known. Understanding this case can help with understanding the possible geometric properties of quasi-amorphous sets.
- I made some further progress on the geometric structure of quasi-amorphous structures.
- I discussed with Prof. Bagaria some promising possible set theoretic contexts for the construction of a non-abelian quasi-amorphous group.

3 Main Results

After reading the papers [Bre93a, Bre93b, Bre90], I was disappointed to find that the results there do not apply in my case. The papers focus primarily on classes of **periodic** non-abelian groups, while the group I wish to construct is necessarily torsion-free [CT01].

I made some further progress on (pre-)geometries found in quasi-amorphous structures. To start with, I looked at the case of amorphous sets not of projective type, a somewhat intractable case from [Tru95]. I had an insight that might be useful in understanding those sets, and which might then be helpful in understanding quasi-amorphous sets.

¹ For background and definitions regarding this project, please see the exchange application.

Finally, discussions with Prof. Bagaria led to the idea to attempt construction of the non-abelian quasi-amorphous group in $\mathbb{L}(\mathbb{R})$ - something I had not considered before. This is an excellent idea, since it is a well studied model that has just the right amount of choice for the needs of my construction.

4 Future Collaboration

No concrete future collaborations are planned at this time.

5 Projected Publications

If my insight about amorphous sets not of projective type holds up to scrutiny, then results stemming from this will be published in a separate paper with acknowledgment of the ESF.

Any future papers that use $\mathbb{L}(\mathbb{R})$ as a context for constructing a non-abelian quasi-amorphous group will contain acknowledgement of Prof Bagaria, and of the ESF.

References

- [Bre90] Jörg Brendle. Cardinal invariants of infinite groups. *Arch. Math. Logic*, 30(3):155–170, 1990.
- [Bre93a] Jörg Brendle. Set-theoretic aspects of nonabelian groups. In *Set theory of the reals (Ramat Gan, 1991)*, volume 6 of *Israel Math. Conf. Proc.*, pages 91–105. Bar-Ilan Univ., Ramat Gan, 1993.
- [Bre93b] Jörg Brendle. Set-theoretic aspects of periodic FC-groups—extraspecial p -groups and Kurepa trees. *J. Algebra*, 162(1):259–286, 1993.
- [CT01] Philip Creed and John K. Truss. On quasi-amorphous sets. *Archive for Mathematical Logic*, 40:581–596, 2001.
- [Tru95] John K. Truss. The structure of amorphous sets. *Annals of Pure and Applied Logic*, 73(2):191–233, 1995.