

Research Statement

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Since I was studying the undergraduate program in Mathematics in the National University of Colombia I was interested on set theory, for that reason I worked on the final thesis work (which is a requirement to obtain the Mathematics degree) called *Definable Versions in Combinatorial Set Theory* which was supervised by professor Andres Villaveces. This work was based on the paper of Amir Leshem called On the Consistency of the Definable Tree Property on \aleph_1 , I studied some simple forcing techniques and learnt some consistency results; also using the knowledge about weakly compact cardinals and Π_1^1 - reflecting cardinals (introduced by Leshem), we studied the paper (preprint) *Weakly Compact Cardinals and κ -torsionless modules* written by Juan Nido, Pablo Mendoza and Luis Miguel Villegas; and proved a result about torsionless modules and κ -torsionless modules using the Π_1^1 - reflecting cardinals . These work was awarded as the Best Undergraduate Thesis of the Mathematics Department and also was chosen to participate in the National Contest of final thesis works Otto de Greiff.

After, I started the Master Program in Mathematics in Andes University (Bogotá), I participate on the First Meeting of Set Theory between Venezuela and Colombia and also I was attending to a course on Forcing of the Reals teaching by professor Jorg Brendle from Kobe University (Japan), since that day I started to read some papers written by him; then he accepted to be my supervisor for the Master Thesis, called *Forcing Notions Presented as Quotients*, which was presented on June of the present year. In this work we studied mainly the results of Jindrich Zapletal and Michael Hrusak of the paper *Forcing with quotients* and answered an open question given by Bohuslav Balcar, Fernando Hernández-Hernández and Michael Hrušák in their paper *Combinatorics of Dense Subsets of the Rationals*.

Now, I'm starting the Phd program also in Andes University, and I want to keep doing research on set theory, also joint with professor Brendle we're going to prepare a paper to show the results of our work.