# Tropical Differential Geometry

*Zeinab Toghani*

Los Andes University

**Abstract:** Let $I$ be an ideal of the ring of Laurent polynomials $K[x_1^{\pm 1}, \dots, x_n^{\pm 1}]$ with coefficients in a real-valued field $(K, \nu)$. The fundamental theorem of tropical algebraic geometry states the equality $trop(V(I)) = V(trop(I))$ between the tropicalization $trop(V(I))$ of the variety $V(I) \subset (K^*)^n$ and the tropical variety $V(trop(I))$ associated to the tropicalization of the ideal I.

In this talk, I will speak about tropical differential geometry and I will show the above result for a differential ideal $J$ of the ring of differential polynomials $K[[t]]\{x_1, \dots, x_n\}$, where $K$ is an uncountable algebraically closed field of characteristic zero.

I define the tropicalization $trop(Sol(J))$ of the set of solutions $Sol(J) \subset K[[t]]^n$ of $J$, and the set of solutions $Sol(trop(J)) \subset (\mathcal{P}(\mathbb{Z}_{\geq 0})^n)$ associated to the tropicalization of the ideal $J$.

I will show the equality $trop(Sol(J)) = Sol(trop(J))$. Later I will extend the definitions for an ideal in the ring $K[[t_1, \dots, t_m]]\{x_1, \dots, x_n\}$.