Geometry on spacelike surfaces and hypersurfaces in de Sitter space

ABSTRACT. In this talk we discuss the geometrical property of singularities of the Gauss maps and lightlike hypersurfaces of spacelike hypersurfaces in de Sitter space. We also discuss the asymptotic directions on spacelike surfaces in de Sitter 5-space. This work is a joint work with Ana Claudia Nabarro and Maria Aparecida Soares Ruas.

It's known that the singularities of a Gauss map of a surface in Euclidean 3-space correspond to the parabolic sets on the surface, and its singular types are generically classified into a fold and a cusp. De Sitter space is one of pseudo spheres in Lorentzian space with index 1. In this space, we may consider a Gauss map of a spacelike surface and discuss geometrical meaning of the singularity of Gauss maps. The singular types of the Gauss map are generically classified into a cuspidal edge and a swallowtail.

Asymptotic direction of a surface in Euclidean 3 space is a null direction of a second fundamental form. We may consider asymptotic directions on surfaces in higher dimension and Lorentzian space analogously.