ABSTRACT
The thesis, in general aims at studying the early history of the Milky way through the chemical abundances of metal poor stars in the Halo and in the satellite galaxies of the Milky way. Halo of a galaxy is one of the early structures that remain pristine to probe the first low mass stars that formed during the first billion years after the Big Bang. According to the hierarchical galaxy formation models, Milky Way Halo could have formed by accretion of smaller satellite galaxies. Several hundreds of such small dwarf galaxies that did not merge to the Halo will be observable now. Low and high resolution, optical and NIR spectroscopic data are used to study the chemical abundances of metal poor stars both from the Galaxy and the satellite galaxies, to understand the common origin of them in the context of Galaxy formation. The details of each project undertaken during the period of the PhD is briefly described below.

_ Chapter-1 includes, introduction of the following topics: metal poor stars, different classes metal poor stars based their origin and composition. Current understanding of the origin of satellite galaxies. Milky way formation and its connection with the satellite galaxies.

_ Chapter-2 includes observations, data analysis and methodology. We also discuss the stellar atmospheric models, radiative transfer codes, atomic and molecular data used in the analysis. Spectroscopic data analysis technique for low- and high-resolution spectroscopy is presented.

_ Chapter 3 provides the details and results of slit less spectroscopic survey of dwarf

satellites of Milky way using Himalayan Chandra Telescope and the follow up studies. Large photometric and spectroscopic surveys like SDSS have been successful in identifying faint galaxies around Milky way. Most of the automated photometric searches, use over densities in the HESS diagrams, using a metal poor globular cluster colour-magnitude diagrams as a representative population for the stars in these faint systems. They also pre-select the sample using various colour cuts to avoid contamination from the foreground stars. Most of these methods identify very few RGB and AGB populations. RGB and AGB members are brighter and can be studied for its detailed chemical abundances, to derive clues of the early stellar population.

We initiated a slit less spectroscopic survey of 6 satellite galaxies using 2m Himalayan Chandra Telescope, India. We detected many new samples in these systems which fall in either RGB or HB group. This blind search and photometric preselection have been compared. Two of such bright metal poor stars identified are being followed up using Subaru. A proposal has been submitted for the same. The faint stars detected cannot be followed up using current facilities but are ideal candidates for upcoming large telescopes like TMT.

_ Chapter 4 describes the abundance analysis of two CEMP stars from Carina dwarf spheroidal galaxy. Carbon-enhanced metal-poor (CEMP) stars bear important imprints of the early chemical enrichment of any stellar system. Plenty of CEMP stars are found in the Milky way halo and their fraction increases with decreasing metallicity. But a very few CEMP stars are observed in the faint dwarf spheroidal (dSph) satellites. So we performed abundance analysis of two metal-poor carbon rich stars in the Carina dSph galaxy using high-resolution spectroscopic data obtained with the ESO/UVES instrument. One of the stars (ALW-1) is showing enhancement in both heavy and light s-process elements thus classified as CEMP-s

star. It is showing radial velocity variation indicating the presence of a binary AGB companion. The other star, ALW-8, show no enhancement in neutron capture elements thus classified as a CEMP-no star which is the first CEMP-no star detected in the Carina dwarf spheroidal galaxy. A moderate enhancement in yttrium is observed in this star indicating a weak r-process activity. Majority of elements detected in ALW-8 show similar abundance pattern of Carina 's field star population as well as with CEMP stars in other dSph galaxies. The overall abundance pattern of ALW-8 confirms that the formation site for CEMP-no stars has been affected by both faint supernovae and/or fast rotating massive stars and by standard core collapse supernovae. It could also infer that the mechanisms responsible for the heavy element production in CEMP-no stars are universal and act independent of the environment such as in the Galactic halo or in dSphs. The results have been published in Susmitha et al 2016, A&A accepted (arXiv:1706.06599).

_ Chapter-5 describes the detailed abundance analysis of an Extremely Metal Poor stars (EMP) from the Milky way halo. EMP stars are one of the subsets of metal poor stars which preserve the chemical composition of first stars in their atmospheres. In order to understand the nature of first stars and the various nucleosynthetic mechanisms existed in the early universe, we initiated high resolution spectroscopic survey of extremely metal poor stars preselected from Multi-object Apache Point Observatory Radial Velocity Exoplanet Large-area Survey (MARVELS) spectroscopic presurvey. One of the stars (SDSS J134338.67+484426.6) with an apparent magnitude V = 12.14, is the lowest metallicity star found in the pre-survey, and is one of the only _20 known EMP stars that are this bright or brighter. Our high-resolution spectroscopic analysis of this star shows that this star is a subgiant with [Fe/H] = -3.42, having 'normal' carbon and no enhancement of neutron-capture abundances. Strontium is underabundant, [Sr/Fe] = -0.47, but the derived lower limit on [Sr/Ba] indicates that Sr is likely enhanced relative to Ba. This star belongs to the sparsely populated class of _-poor EMP stars that exhibit low ratios of [Mg/Fe], [Si/Fe], and [Ca/Fe] compared to typical halo stars at similar metallicity. An ISM with contributions from Pop III intermediate mass stars along with a later stage Pop II contributions with a low SFR can explain the abundance pattern seen in this star. The abundance analysis and the results of this star has been published in Susmitha & Sivarani et al 2016, MNRAS,458,2648.

_ Chapter 6 discusses the HESP- TIRSPEC synergy of CEMP stars in the Milky way halo. The large fraction of CEMP stars at lower metallicity indicates the physical mechanisms that causes production of carbon at earlier evolutionary stages of the Milky way. High fraction might also indicate that the IMF in the earlier times included large number of intermediate to high mass stars than the present day. Abundance of carbon, nitrogen and oxygen play a crucial role in understanding the nature of the progenitors and origin of carbon in these stars. We studied four cool CEMP stars from the Milky way halo, in optical high resolution and NIR medium resolution to derive the abundances of C, N and O using, C2, CN, CH. [OI], and CO features. We compared the oxygen abundance derived from optical [OI] lines and CO band in the NIR and found reasonable match in the derived abundance. The CNO abundances together with s-process element abundance and radial velocity monitoring in these four samples revealed that, they are having an AGB companion. The properties of the companion and possible origin of the C, N and O has been discussed in the chapter.

_ Chapter 7 includes the conclusion and future.