HCT@20 – Abstract book

Speaker: T.P. Prabhu
Title: Making of Indian Astronomical Observatory: From site identification to Himalayan Chandra Telescope
Abstract: A large optical telescope at the best site in India was a vision of Megh Nad Saha and the dream of Vainu Bappu. IIA has strived for this throughout its new life as a national institute fully devoted to astronomy and astrophysics. I describe here the efforts of IIA in identifying the high altitude clear site at Hanle and establishment of IAO with the 2-m Himalayan Chandra Telescope, as a first step towards a national large optical telescope.
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Speaker: R. Srinivasan
Title: Technical Challenges Faced During HCT Installation
Abstract: The Himalayan Chandra Telescope is a 2.01 meters diameter optical-infrared telescope, named after India-born Nobel laureate Subrahmanyam Chandrasekhar.The Himalayan Chandra Telescope (HCT) was approved in the year 1997. It contains a modified Ritchey-Chretien system with a primary mirror made of ULE ceramic, 2m aperture f/1.75 primary, f/9 Cassegrain Telescope. The telescope was manufactured by Electo-Optical System Technologies Inc. at Tucson, Arizona, US as per IIA's specifications. It was installed at the Indian Astronomical Observatory (IAO), Mt. Saraswati, Digpa-ratsa Ri, Hanle, Ladakh at an altitude of 4500 m (15000 ft) above mean sea level (msl) by the Indian Institute of Astrophysics (IIA), Bangalore, in August 2000 (First light) and equipped with instruments, during the years 2001-2003 (First light). HCT is in regular use since May 2003. The telescope is remotely controlled from CREST, Hosakote, via INSAT-3B satellite link, which allows operation even in sub-zero temperatures in winter. It is the country's first robotic telescope. The technical challenges faced by IIA during the execution of this prestigious project are covered in this lecture. The topic has been addressed under the following headings: Road construction, Infrastructure ,Telescope transportation, Civil, Elecrial, Electronics, Computer & Communication.
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Speaker: Annapurni Subramaniam
Title: HCT spectroscopic survey of Classical Be stars in Open clusters and Galactic field
Abstract: Classical Be stars are B-type main-sequence stars, that show the presence of emission lines in their spectra. These stars are present in star clusters and in the field. We performed a survey using the HCT in the slit-less spectral mode, which is a unique mode of observation available with the HFOSC. In the survey, 207 open star clusters were observed using slit-less spectroscopy method and 157 emission stars were identified in 42 clusters. We found 54 new emission-line stars in 24 open clusters, out of which 19 clusters are found to house emission stars for the first time. Our results indicate that there could be two mechanisms responsible for the Classical Be phenomenon. Some are born Classical Be stars (fast rotators), as indicated by their presence in clusters younger than 10 Myr. Some stars evolve to become Classical Be stars, within the MS lifetime, as indicated by the enhancement in the fraction of clusters with Classical Be stars in the 20-30 Myr age bin. The slit spectra were obtained for 157 stars and those in the Galactic field to compare their properties. Three theses have come out of this study so far.
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Speaker: D.K. Ojha
Title: The Episodic Accretion in Young Low Mass Stars and NIR instrumentation with 2-meter HCT
Abstract: The low mass young stellar objects (LM-YSOs) that are still accreting from their disc, are observationally found to undergo short duration outbursts which are separated by long quiescent phases. These rare outburst phenomena observed in LM-YSOs are called FU Ors and EX Ors. The episodic

nature of accretion seen in these LM-YSOs can shed light on several open problems in star formation and accretion disc theories. In this talk, I will present results from our long-term monitoring observations with 2-meter HCT of a few rare types of eruptive young low mass variables. I will end my talk with a brief presentation on the activities of the Infrared Astronomy Group of TIFR with special emphasis on the ground-based Near Infrared Instrumentation (e.g., TIRSPEC on 2-m HCT) for star formation studies.

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Speaker: Soumen Mondal

Title: Understanding of Pre-main Sequence Stars in Galactic Star-Forming Regions

Abstract: Galactic star-forming regions are the formation sites of young stars in Pre-Main Sequence (PMS) different stages including massive O, B type stars in H II regions. Multi-wavelength studies on such regions help to understand the census of PMS stars, their formation process, and the interaction of expanding H II regions with its natal molecular clouds. PMS stars first came into the spotlight due to their photometric variable characteristics. Variability studies have been performed on understanding of their rotation rates and the role of angular momentum in their stellar evolution. The variability in a PMS star is thought to be originated via various mechanisms e.g., magnetically induced cool starspots or magnetically channeled variable accretion flows generating hot spots on the star surface, eclipsing binary, opacity due to non-uniform dust distribution, etc. In this presentation, we like to highlight some of our results obtained from the excellent Himalayan Chandra Telescope (HCT) facility at Ladakh, India operated by Indian Institute of Astrophysics (IIA), Bengaluru.

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Speaker: Jessy Jose

Title: Star formation studies in outer Galaxy with HCT

Speaker: The star forming regions in outer Milky Way Galaxy have an entirely different environment compared to solar neighbourhood in terms of low metallicity, underlying low-gas density, Galactic rotation and shear. The outer Galaxy star forming regions are therefore an excellent landscape to understand the role of external environmental factors on the formation and evolution of low-mass and young stellar objects. Studies of a few star forming regions beyond the solar circle have been performed using HCT and the major results will be highlighted in this talk.

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Speaker: Armando Ferro

Title: 17 YEARS OF HANLE GLOBULAR CLUSTERS CCD PHOTOMETRY

Abstract: In this brief lecture I will summarize the goals and some very interesting results of our long-term project studying Galactic globular clusters from the perspective of their populations of variable stars. The final aims include studying the structure of the Horizontal Branch, the evolution of emblematic groups of variables, such as RR Lyrae, SX Phe or W Vir across the instability strip and the implications of secular variations in their pulsational periods. Accurate differential photometry has enabled us to produce superb Colour-Magnitude diagrams (CMDs) and to discuss some of the fundamental properties of the parent globular clusters, such as their metallicities, reddenings, distances and ages. The accurate CCD PSF photometry has resulted in the production of accurate light curves, even in crowded fields in the central regions of the clusters, which in turn allows good determinations of the pulsational frequency spectra, identification of multiple mode pulsators, the Fourier decomposition of the light curves, and the use of some of these variables as indicators of distance and metallicity. More recently, with the advent of Gaia proper motions, we have been able further clean the CMDs from the contamination of spurious field stars, and to discuss the dynamics of certain clusters.

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Speaker: B.E. Reddy

Title: Puzzle of Li enhancement in red giants.

Abstract: Large Li abundance measurements in a few red giants has been a nagging problem in the literature for over four decades. This is because existing theoretical models do not predict Li

enhancement in stars which is in general agreement with most of the observations. In this talk, I will describe our significant contribution to the field using 2.0-m HCT spectroscopic survey.

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Speaker: **Aruna Goswami**

Title: In search of chemical imprints of the first stars: clues from the HCT survey of CH/CEMP stars

Abstract: Most of the low metallicity stars (-6 < [Fe/H] < -4) known so far, the Hyper-Metal-Poor and Ultra-Metal-Poor stars, are carbon-enhanced that do not show enhancement of neutron-capture elements. These stars are likely born very early in the Universe, and likely to provide valuable clues on the first stars, early nucleosynthesis, first supernovae and early Galactic chemical evolution. We have conducted a low-resolution spectroscopic survey of the Galactic high latitude carbon stars using HCT/HFOSC with an aim to find potential candidate stars that may still exist retaining the chemical imprints of their progenitors, the population III stars. About five hundred objects are observed so far under this program. Analysis of the spectra and classification of the objects with strong C_2 molecular bands in their spectra led to the detection of different types of carbon stars, C-N, C-J, C-R, CH, RCB, and HdC stars including the first HCT discovery of a rare Hydrogen deficient carbon star HE 1015-2050. More than hundred potential CH/CEMP star candidates are also being detected. Some results obtained from the follow-up high resolution spectroscopic studies of a selected sample of these stars that provided observational constraints for the origin and evolution of these stars will be presented.

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Speaker: **Shejeelammal J.**

Title: Characterizing the companion AGBs: new results from HCT/HESP studies of barium stars

Abstract: The origin and evolution of neutron-capture elements in our Galaxy is poorly understood. The AGB stars are known to be the major contributors of carbon, nitrogen and s-process elements in the Galaxy. However, the lack of understanding about the exact physical conditions and the nucleosynthesis occurring in their interiors underscores the need for detailed studies. Extrinsic barium stars which are known to have received products of AGB phase of evolution via binary mass transfer mechanisms can provide important clues. The neutron source and the nucleosynthesis product distribution pattern depend on the initial stellar mass. In this talk, we will discuss how [Rb/Zr] ratio of the barium stars can be used as an important probe to derive the neutron density and the mass of the companion AGB star. Results obtained from a parametric model based study will also be presented.

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Speaker: **T. Sivarani**

Title: Stellar archeology with HCT

Abstract: Stellar archeology deals with the study of old stars and uses them as a tool to probe the early history of the Galaxy. In HCT, there are several observing programs related to stellar archeology that are actively pursued. Low and high resolution optical and NIR spectroscopy of metal poor stars from the Milky Way Halo, Globular clusters and its satellite galaxies was performed using various instruments at HCT. Here, we will present some results from the HESP-GOMPA survey and progress in slitless spectroscopy.

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Speaker: **Avarjit Bandopadhyay**

Title: Origin and abundances of r-process rich stars in the Galaxy

Abstract: The abundances of the ancient population of stars provide a great deal of information regarding the nucleosynthetic processes that created the elements. Among the most important elements for tracing the nature of early-generation stars and the early evolution of the Galaxy are those formed by the rapid neutron-capture process (r-process). Here, we present study of newly discovered r-process enhanced (RPE) stars among very metal poor stars to probe the origin of r-process sites in the early Galaxy. The observations were based on the Hanle Echelle Spectrograph and targets were pre-selected from SDSS-MARVELS survey. We study r-process elements belonging to the weak (Sr,Y, Zr), main (Ba, Ce,

Nd, Sm, Eu, Dy) and strong r-process peak (Th) along with other chemical elements. We tried to understand the elemental abundance ratio in connection to the r-process enrichment to probe the possible sites. In this work, we have derived the detailed elemental abundances for five newly identified relatively bright RPE stars, which are ideal candidates for detailed higher-resolution abundance studies, even with modest-aperture telescopes.We have also compared our program stars with the different known classes of RPE stars, and argue that the contribution from SNe-II decreases with the level of r-process enrichment. We have also shown that the abundance for heavier r-process elements is enhanced for the RPE stars, with r-II stars not following the usual trend as other halo RPE stars. The r-process-element abundances of our program stars match with the scaled-Solar abundances, conforming with the known universality of the main r-process, along with the usual scatter for the lighter r-process elements. One of our program stars, SDSS J0043 +1948, is one of the brightest known RPE stars with a Th measurement, and has been shown to be an actinide-boost star. This new sample of bright RPE stars offers the unique possibility for the detection of many more key neutron-capture elements, from the ground and from space with the Hubble Space Telescope. Finally, we also address the open questions and uncertainties which lead to complications in understanding the observed abundance patterns of the r-process along with astrophysical conditions and sites of their production at the early epochs in metal poor stars.

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Speaker: Susmitha Rani

Title: Milky Way halo through the eyes of HCT

Abstract: The Milky Way halo comprises different stellar populations with distinct chemical signatures. This includes carbon enhanced stellar populations and extremely metal-poor stars. These stars are unique because of their peculiar abundance pattern and/or low metallicity. Their abundance patterns provide clues on their formation epoch, nature of their birth cloud, and different nucleosynthesis processes that occurred in their progenitors. These stars also help us to connect the current state of the Galaxy with its long assembly history involving the accretion of neighboring smaller galaxies. The various backend instruments onboard HCT offer many ways to probe these populations in different wavelengths. In this talk, I will highlight the results of our studies using HCT-HFOSC, HCT-HESP, and HCT-TIRSPEC to understand the origin of different stellar populations in the Milky Way halo.

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Speaker: Anirban Bhowmick

Title: Exploring the evolutionary origins of low-mass hydrogen-deficient stars using HCT.

Abstract: The origins and evolutionary history of the exotic, low mass, hydrogen-deficient (H-def) supergiants are a matter of great interest in stellar astrophysics. In our work, we explored the evolutionary connections between the four groups of low mass H-def supergiants namely: DY Persei variables, hydrogen-deficient carbon stars (HdCs), R Coronae Borealis stars (RCBs), and Extreme Helium Stars (EHes), by analysing their observed spectra. Ranging from cool, N-J type DY Persei variables to the very hot A-B type EHes, these stars share some extreme abundance anomalies apart from H-deficiency: (i) an extreme overabundance of ^{18}O in HdCs and cool RCBs such that $^{18}O/^{16}O > 1$, observed by Clayton et al. (2007) from the molecular bands of $^{12}C^{18}O$ in near-IR (NIR), (ii) a startling overabundance of fluorine (F) in warm RCBs and cool EHes such that F relative to Fe is enhanced by 800 to 8000 times, determined from neutral fluorine lines (FI) in optical by Pandey (2006), Pandey et al. (2008). The status of ^{18}O in the cool DY Persei variables and F in hot EHes were unknown. If the chemical peculiarities are found to be common across the sequence of DY Pers, HdCs, RCBs, and EHes, a common formation scenario would seem to be likely. HCT with a couple of high-quality spectrographs, mainly TIRSPEC and HESP enabled us to explore these daunting questions by providing an opportunity for spectroscopic observations, encompassing a wide wavelength range starting from NIR to optical blue. While TIRSPEC allows for low-resolution spectroscopy in the NIR region, HESP delivers the opportunity for high-resolution spectroscopy in the optical regime. In this talk, I will discuss how high-quality data from these two

instruments enabled us to successfully investigate the evolutionary-connection between these enigmatic H-def supergiants.

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Speaker: Karan Meech

Title: Formation of habitable world with small solar system body

Abstract: Small primitive bodies can provide information about the solar system's formative processes, including the contribution of presolar and interstellar sources. Interstellar objects are thought to be planetesimal remnants that have been ejected out of their own solar system, and they can provide insight into the process of building exoplanetary systems. The most primitive Solar System objects are found beyond the asteroid belt. They have largely been undisturbed since their formation. Thus, their compositions provide a fossilized record of the chemical make-up of our planetary system during its origin. No one knows how water arrived at our planet, or whether our solar system, with a planet possessing the necessary ingredients for life within the habitable zone, is a cosmic rarity. We do not know the role that the gas giants played in delivering essential materials to the habitable zone. The answers to these questions are contained in unaltered primitive body volatiles. The most likely volatile delivery candidate came from the outer solar system. Evidence of what arrived at Earth is hard to determine from Earth materials because of the processing that has occurred. However, whatever was delivered to the inner solar system was also trapped in the asteroid belt where some of those primitive materials exist today. Studying accessible volatiles in the main belt, found in the main belt comets will provide some of the key information needed to understand the origins of these materials. In order to understand the formation of our planetary system we have to not only trace the early chemistry, but also understand the dynamical environment. A new class of objects, the Manx comets, may provide clues to allowing us to trace the dynamical history. This talk will touch upon what we are learning about the early solar system from these small bodies, and the contributions from the HCT to the understanding of the early solar system and formation of habitable worlds.

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Speaker: Shasikiran Ganesh

Title: Spectroscopy of comets from the HCT

Abstract: The optical spectra of comets show strong signatures of fluorescence emission by molecules in the cometary coma. Many comets, including the only interstellar comet to be detected so far, have been studied using the HCT instruments over the last few years. Spectroscopy of comets requires long exposures and significant non-sidereal rate tracking has to be employed to ensure that the telescope follows the comet, relative to the background stars. This has required efforts in understanding the technical details of the telescope control system in planning and executing the observations. In this talk, I will present the results of our observations with HESP and HFOSC.

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Speaker: Sujan Sen Gupta

Title: HCT Eyes Brown Dwarfs and Exoplanets

Abstract: If planets belong to the lowest level in the mass hierarchy of celestial objects, Brown Dwarfs inhabits the realm between the least massive stars and the most massive planets. Together, they are called substellar mass objects. Brown Dwarfs are cooler than the coolest stars, e.g., M dwarfs and they have quite different spectral characteristics. However, the atmospheres of Brown Dwarfs and hot giant gas planets resemble in many aspects. By using differential photometry at Himalayan Chandra Telescope (HCT), the R-band variability of Brown Dwarfs was detected for the first time. No correlation with the rotation period of the objects convinced the presence of cloud and its dynamic in the visible atmosphere. I-band variability of the same objects were also confirmed by using HCT. On the other hand, HCT enabled high precision transit photometry of already discovered Extra-solar planets and the observed data provided improved physical parameters for the exoplanets. Thus, HCT and the instruments on board

the telescope offered a good opportunity to take IIA's research activities beyond stellar objects, to the substellar-mass regime.

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Speaker: Parijat Thakur

Title: Probing Possible Origin of Transit Timing Variations of Extra-solar Planets through Follow-up Observations of their Transits using 2-m HCT Telescope

Abstract: The transit method is one of the most useful methods for detecting extrasolar planets and has several advantages over other detection methods. The photometric follow-up observations of transiting extrasolar planetary systems not only provide the precise measurement of the stellar and planetary parameters but also allow for the refinement of the transit ephemeris. In addition to this, the precisely estimated mid-transit time can further be used to examine the transit timing variations (TTVs), which could be due to the presence of additional bodies in the planetary system when the TTV signal is periodic. Other possible origins of TTV are the orbital decay and apsidal precession of planetary orbit, induced by tidal interaction between planet and its parent star. In order to probe the existence of TTV and its possible origin, we have carried out the photometric follow-up observations of a few transiting extrasolar planetary systems using the 2-m Himalayan Chandra Telescope (HCT), as well as other telescopes available in India and abroad. In this talk, we present our observations and results for the extrasolar planetary systems TrES-3 and Qatar-1.

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Speaker: Kuntal Misra

Title: Assessment of supernova explosion parameters using optical observations

Abstract: Supernovae (SNe) are giant stellar explosions that outshine the entire host galaxies for a fraction of seconds. After the explosion, the light from the photosphere reaches the observer which varies with time. The variation of light with time is disparate for different classes of SNe and is one of the important observables used to classify SNe. The spectra of SNe show lines of many species depending on the type of SN. In this talk I will present the results of extensive SNe monitoring with HCT for the last two decades. The observations at different phases of SN evolution are useful to characterise the SN as well as estimation of various physical parameters such as the explosion energy, Oxygen mass, progenitor mass etc. The asymmetries in explosion can be identified with good quality data at nebular phases of SN evolution.

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Speaker: N.K. Chakradhari

Title: Observational studies of thermonuclear supernovae using HCT.

Abstract: Thermonuclear supernovae also known as type-Ia supernovae (SNe Ia) are regarded as important astronomical objects for distance estimation due to their homogeneous nature. They are believed to result from the thermonuclear explosion of a white dwarf (WD) either accreting matter from its companion or merging with another WD in a binary system. However, the nature of progenitors and explosion mechanisms are still under investigation. Also, recent detection of some peculiar events have raised questions on their homogeneity. Further, an accurate estimate of reddening is crucial to find their luminosity, as several studies suggested lower values of ratio of total-to-selective extinction (Rv) towards SNe Ia in their host galaxies. Hence proper care should be taken while using these objects as distance indicators. Results obtained using HCT will be presented.

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Speaker: Avinash Singh

Title: Follow-up of Supernovae from Himalayan Chandra Telescope

Abstract: Himalayan Chandra Telescope has been the primary driver of efficient and effective observation of transients in India. Supernovae are the cataclysmic explosion of a star that results from either the core-collapse in a massive star that is nearing its end stages of evolution or a thermonuclear runaway in a white dwarf. In this talk, I will give an overview and highlight of the work undertaken in recent

years on core-collapse and thermonuclear supernovae (SNe) by the transient group at IIA. I'll be presenting the results based on optical photometric and spectroscopic observations of various classes of SNe: hydrogen-rich SNe (SN 2016gfy, SN 2017hcc, SN 2018hna, etc.), hydrogen-poor SNe (ASASSN-16fp, SN 2014ad, etc.), and thermonuclear SNe (2017hpa, 2019np, etc.). Detailed temporal and spectral evolution of SNe from HCT have allowed us to infer the explosion parameters and information about the progenitor of these SNe.

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Speaker: Firoza Sutaria

Title: A postmortem study of the environments and evolution of massive stars.

Abstract: The evolution of the post-explosion supernova fireworks depends as much on the structure of the progenitor, as it does on the geometrical distribution, composition and density of the surrounding circumstellar material (CSM). Mass loss from massive progenitors is an as-yet a poorly modelled and poorly understood phenomenon, but it leaves unique signatures on the multi-waveband evolution of a supernova event. In this talk, I will focus on how the optical observations from the HCT were combined with x-ray and GMRT observations to tease out and model CSM for massive progenitors in the range 8 to 15 M_sun. This, in turn, allows us to model the post-MS evolutionary path of the progenitors, and to tightly constrain their masses (up to with 0.1 M_sun) for the first time.

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Speaker: M. Pavana

Title: To understand novae, through the HCT

Abstract: Novae have been monitored with the HCT since 2003 during outburst as well as quiescence phases. Temporal evolution of the outbursts is studied in detail, and 3D morphological structures of the ejecta have been studied. Novae belonging to different spectral classes were used to have a better understanding of these systems in general and obtain an exhaustive model. The results of the temporal evolution and 3D morphology of the ejecta of a few recent events will be discussed in detail.

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Speaker: S.B. Pandey

Title: 2.0m HCT: Afterglow observations of GRBs and key findings

Abstract: During my presentation, I will summarize key science outcomes obtained using photometric and spectroscopic observations of afterglows of GRBs since 2000 using 2.0m HCT.

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Speaker: Varun Balerao

Title: Studying rapidly evolving transients

Abstract: Time domain astronomy has gained increasing importance in this decade - with new developments in studies of relativistic transients like gamma ray bursts, and the discovery of the first multi-messenger counterparts in gravitational waves and neutrinos. The field is set to rise further with upcoming facilities like the Vera Rubin Observatory's LSST. Indian observatories occupy an important longitude, critical for the study of these events. I will talk about the important role HCT has played in such follow-up observations, and some key results from the efforts. I will also talk about the synergy of HCT with other facilities in the country.

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Speaker: Amit Mondal

Title: REMAP: REverberation Mapping of Active galactic nuclei Program at HCT

Abstract: The dusty torus in active galactic nuclei (AGN) plays the important role of differentiating AGN into type I and type II. It is difficult to resolve the torus using conventional direct imaging techniques. However, recently near infrared (NIR) interferometric observations using the ESO Very Large
Telescopes are able to resolve torus scale regions on AGN but this is limited to few nearby and bright AGN. An alternative to the interferometric technique to find the extent of the dusty torus in AGN that overcomes the limitations of IR interferometry and observationally cheap, is through the technique of dust

reverberation mapping (DRM). DRM is based on the delayed response of reprocessed NIR continuum emission from the torus to changes in the optical/UV continuum emission from the accretion disk. A carefully selected sample of AGN is being monitored in the optical and NIR bands using HCT as part of REMAP (REverberation Mapping of Active galactic nuclei Program) since 2016. This program is also now expanded (during the last two cycles) to find the size of the broad line region and black hole mass in AGN. In this talk, I will highlight the importance of REMAP on AGN studies, the results obtained so far and the scope for expansion in the future.

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Speaker: Mousumi Das

Title: Studying Low Luminosity Galaxies with the HCT

Abstract: Low luminosity galaxies are the most dark matter dominated systems in our local Universe. They are also the most poorly evolved due to the diffuse nature of their stellar disks and low star formation rates. Although most of them are in isolated environments, some are also in voids, and some also lie along filaments in the cosmic web. In the past few years we have been studying different aspects of gas rich, low luminosity galaxies such as their star formation rates, their bar properties and their nuclear activity. These studies have been done with the Himalayan Chandra telescope (HCT). In this talk I will present results from our optical and near-IR HCT studies of low surface brightness (LSB) galaxies and void galaxies, highlighting some of the unique results that we have obtained using this facility.

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Speaker: S. Ramya

Title: Insights into the star formation history of Dwarf galaxies: clues to their evolution.

Abstract: An extensive study to understand the processes of star formation in Dwarf galaxies specifically blue compact dwarf galaxies (BCDs) and tidal dwarf galaxies (TDGs) has been undertaken with HCT. Dwarf galaxies form excellent laboratories to study star formation processes and physical conditions of the ISM as they are relatively simpler low-mass systems. Deep photometry, spectroscopy and narrow band images of star forming regions of BCDs reveal that several of these systems undergo stochastic self-propagating star formation triggered by the stellar and supernova feedback originated in the central regions. Apart from an underlying old stellar population and younger population, BCDs also host an intermediate population of ~500 Myr within the galaxy. We hypothesize that BCDs undergo a burst of SF for a certain longer duration (of about a few 100 Myr to a Gyr) followed by a short/long quiescence. The external triggers for star formation cannot be ruled out either for systems residing in groups and this led our interest into understanding tidal dwarf galaxies. I will present a comparison of these nearby star forming dwarfs with intermediate redshift and high redshift systems to probe the progenitor theory of BCDs. For studies involving star formation histories of galaxies, back-end instruments like integral field spectrographs (IFS) attached to HCT-class telescopes will be highly beneficial. Access to national large telescopes is extremely necessary to further our understanding of assembly processes of such low luminosity systems.

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Speaker: Bhuwan Bhatt

Title: Earth Science and Atmospheric studies at IAO-Leh/Hanle-Ladakh

Abstract: Ladakh has unique features in terms of its geography and environment. The presence of IIA in this region attracted many other institutions to carry out their science studies. During the development of IAO at Leh/Hanle in Ladakh, studies in the allied fields were started. Some of the long term studies are still being continued from Leh and Hanle, such as: a) GPS-Geodesy study of Ladakh region to explore deformation rates and kinematics, b) Research in Greenhouse gases and flux measurement of these to get reference concentration levels for the Indian monitoring network, (both supported by CSIR-4PI formerly C-MMACS, Bangalore) and c) Aerosol Characterization and Assessment of the Radiative impacts from the High-altitude trans-Himalayan site in Hanle, Ladakh (supported by ARFI/ISRO-GBP). A brief summary of these projects and current status will be presented

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Speaker: **Dorje Angchuk**

Title: Hanle Dark Sky Sanctuary

Abstract: Hanle and the adjoining Chanthang region in India is just about the last refuge of darkness where one can witness the Splendours of Night Sky including our own Milky Way Galaxy- 'the brilliant river of stars', which inspired philosophers, scientists and poets throughout history, until we began to illuminate the nightscape with artificial lights. While the world at large is taking significant action to reduce the exploitation of nature and reduce light pollution, we need to expand these efforts by creating and preserving the dark skies of Hanle in the form of Hanle Dark Sky Sanctuary. Here in this talk I would be showcasing the splendours Hanle Dark Sky Sanctuary and talking about its preservation.

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Speaker: **G.C. Anupama**

Title: Future Prospects at IAO

Abstract: Twenty years of astronomy from IAO has shown the stability of the site, and its potential for hosting larger facilities. IAO has also emerged as a good site for facilities in wavelength regions other than optical. Already, the site hosts telescopes for observations of TeV gamma-rays, and a facility in the terahertz region is planned. In this talk I will discuss the future plans with regards to HCT and proposed facilities.

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