Preface

Currently we are passing through an era of rapid technological and socio-economic changes and the aura of such changes make us believe that we are living in an information society. The technological revolution in the last four decades has made tremendous impact on the way information is processed, stored, retrieved and disseminated. Believe it or not, admit it or not, the growth and developments of Information Technology (IT) is one of the most significant achievements of the present century. IT impacts on society, professionals, scientific communication, information seeking, use and information system design, is very essential to understand the changing scenario of Information Centres and Libraries (ICLs) which are not very relevant to traditional Library and Information Science (LISC).

The Information Seeking Behaviour (ISB), involves a set of actions that an individual takes to express his/her information needs, seeks evaluates, choose and uses his/her information. There are various ways and means to acquire variety of information for the various purposes from enumerate services. However, many of these are very different to get due to various reasons viz knowledge, explosion social factor, population, expensive, complex, languages, form, format and geographical location. It is an Information Centre and Library (ICL) which provides any meaningful information from various sources. Consequently, the role of librarians / information officers and ICLs becomes vital to cope with the information on needs of their users. They develop their resources: materials, manpower, money, etc. to achieve above objectives. Hence, it is essential for them to understand the ISB of their users. Consequently, understanding the ISB of various professional groups is essential to help in planning, operation, implementation and decision making of information system and services in given work settings. Therefore users ISB should be taken into consideration.

ICLs are integral part of education, R&D viz research & development organization, education institution, university, etc. It not only organizes to meet the information needs of scientists, faculty, users, and staff but also supports to achieve the objectives of institute and research needs of its users. Last few decades have witnessed the alarming changes in the higher education and research centres. Consequently, pressure has been exerted upon the traditional role of ICLs. There are three main
components of information seeking behaviour (Information, seeking and behaviour), which have been expressed as acronym “ISB” to argue in this research study.

Here behaviour refers to the behavioural aspect of users, while seeking refers to know/ learn the tricks methodology and techniques to get the pinpointed information. However, information refers to the professional knowledge/information that allows ICLs users to think and act in a professional manner. The main contribution of the ISB in this study is ability to view the domain from a new perspective to reflect expectations of users as well as Library and Information Science (LISc) professionals. The ISB of users of academic ICLs as well as librarians have been changed due to IT based ICL services, resources and systems, in developed and developing countries more quickly. Knowledge, skills and attitudes enhance people’s ability to meet their basic needs, widen the range of options opened to them in every sphere of life. At the same time users, as well as librarians raised their level of ISB of new IT through various education programmes, professional trainings.

Scientists in the field of Astronomy and Astrophysics (AA) are working under many constraints, contrary to other scientists of R & D. The AA has exploded in recent years, branching into innumerable specialties. The basic goal of this study is to obtain a clear view of what, how, why, when and where to seek information by the AA users. The AA scientists seek and use information in various ways, means for different purposes in the changing scenario of IT based digital information services. However, due to various aspects of IT as well as resources, changes in the ISBs among the AA scientists have also been noticed. Knowledge about information needs and seeking behaviour to cope with the users’ needs is a crucial factor, especially scientific community. Consequently, they must be supported with pinpointed, proper information, at proper time. Users’ study is an area in LISc and forms a large body of literature in the discipline. Academic librarians can play a crucial role in this endeavour by providing scholarly library resources and services to fulfil the complex needs of scholars in AA and related disciplines. In order to achieve these objective as well as responsibilities, it is essential for information officers, librarians working in Science and Technology (S&T) subjects to have a thorough knowledge, understanding of the research and teaching philosophies, activities and trends in these disciplines. It is equally important for AA information
officers, librarians to have an understanding of the information needs and ISBs of these scientists as well as how their needs and behaviours changes due to the dynamic and specialized nature of their respective scientific fields from time to time in the Information and Communication Technology (ICT) environment. Librarians and other information professionals have to examine the ways in which science scholars articulate their information needs, as well as how they seek and use information. Hence, the present study.

Statement of the Problem / Research Questions

The study was proposed to address following main questions:

- What are the networked information-seeking strategies of AA scientists/users in India?
- How can effective networked information seeking strategies are categorized to assist their use in appropriate situations of information need?
- What are the important new ICT-based services to be added to provide proper information to proper users at proper time in proper form and format, irrespective their geographical location and language?
- What are the issues of how AA users will understand and access/adapt to the new ICT-based Information Retrieval (IR)?
- What are the reasons for considering this issue, in order both to understand the nature of scientist's/user information seeking goals, and the ways in which they attempt to reach them in their interactions in IR systems?
- What are the information needs and seeking behaviour of Indian AA scientists/users engaged with research and reaching in field of AA and to help AA ICLs of India to re-orient their collections, services and facilities to synchronize them with the information needs and seeking behaviour of their scientists/users?

This study is concerned with the above issue of how AA scientists/users will understand and access/adapt to the new ICT based information retrieval (IR). Consequently, it is expected that this study will also investigate the information needs and seeking behaviour of Indian Astronomers, scientists, research scholars and users.
engaged with research in AA. Results may help AA ICLs in India to re-orient their collections, services and facilities to synchronize them with the information needs and seeking behaviour of their scientists.

Review of Research Literature

From the above overview of the literature on ISB of users at global, as well as India level and in particular physics and AA field of users has been covered from 1948 to July 2009. The data obtained from the literature search/search were collected from Library, Information Science & Technology Abstracts (LISTA) database, search through Internet, etc. and summarized into initial list. It indicates that there are very few if not negligible studies have been carried out on the part of librarians, Astronomy ICLs and specially astronomers/ scientists/ users; however none of them are directly related to the present study. The rapid change in the delivery of libraries and information sciences including archival materials in the electronic age appear to have brought confusion not only to the organization and the information providers but also to the library users. The present study is attempted to study ISB of Indian users/ astronomers/ scientists and understand their ISB in era of new Information Technology (IT). However, in this study and other studies in recent years, it has been observed that there has been growing use and awareness of users' ISB of users within higher education sector. It has also been noticed that study of ISB help understand users to develop their personality and behaviour, routine needs, decision-makings, problem solving, critical thinking, effective communication, teamwork, etc. Existing literature relevant to research was examined i.e. ISB of users published by LISc professionals nationally and internationally were studies. This was also supported by the relevant literatures achieved by receiving course offerings, presented on the websites. One of the most significant points to emerge from the review of current available literature was lack of any exhaustive study, about users of academic ICLs and their ISB in the field of AA. The terminology and definitions used in the study were also extracted from the literature reviewed.
Significance (need) of the Study

A scientist is a consumer as well as producer of information as he/she acquires, manipulates, updates, improves and report information. Consequently adequate understanding of the information needs and ISB of users is necessary for the proper planning and improving ICL services in the given work settings. There are several studies concentrates on the specific subjects or fields in the area. The study of ISB of users especially in developing countries has been a significant and eventful issue from last few decades. It is proposed to study ISB of users in AA ICLs; because knowledge about the information needs and seeking behaviour of users could play a vital role in meeting their information needs effectively. While scientific and technical information continues to grow exponentially, the users/scientists working in AA feels that they are not getting their pinpointed information at proper time. Consequently, the first dimension is to find out the needs, to know behaviours (Attitudes, Skills and Knowledge) (ASK) of personnel working in AA. Significant changes have been observed in ISB including increased reliance on web based resources, fewer visit ICLs, use and availability of various resources in electronic forms: e-mails, discussion groups, bulletin boards, etc. The researcher’s interest in this subject is to find out gaps between the information needs, availabilities, and information services and also to suggest for bridging the above gaps. The researcher’s long experience working with the AA scientists has also motivated to make close insight in to their ISB due to modern information technology. Keeping the aspect in the view the researcher has proposed to carry out a contemporary problem of Library and Information Science (LISc) interest entitled “Information Seeking Behaviour of Users in Astronomy Information Centres and Libraries in India: The Impact of New Information Technology”. The importance of information of AA scientist has been felt long back; however the need to feed the information system closely related to AA is more strongly felt now, than ever before. This has been reflected in various studies (details given in the review chapter-II). In view of the above, though the importance of scientific and technical information about user’s studies has been conducted & reported, however a special category of scientist viz AA scientist is neither investigated by many nor broadly known so far. Therefore, adequate knowledge of the information needs, ISB of users in imperative for ICLs in re-orienting their collections,
services and activities to synchronise them with ISB of their users. In present study is in efforts in this direction.

**Objectives of the Study**

The main objectives are:

- To examine at what extent ISB of users of AA in India has changed in the changing digital era.
- To identify types and range of electronic information resources currently used by academics/researchers in field of AA and also to determine the level and spread of their use for seeking information.
- To study the purpose of Information seeking by AA scientists.
- To determine and analyse the impact of these systems on communication and exchange of professional knowledge among scientists, users, readers, etc of AA.
- To find out the possible factors and problem faced by AA scientists, which trigger the information, need and the association of ideas, or logical consequence that leads to a particular ISB, with seeking and using information.
- Furthermore, to assess for generic use of ICT for their ISB viz various databases, search engines, strategies, catalogues, internet/intranet, particularly from journals/books and review articles, for their various purposes, etc.

**Hypotheses of the Study**

It is proposed to verify and test the following hypotheses:

**Firstly**, user’s needs are changing towards the interdisciplinary approach based on IT. It is hoped that knowledge about the ISB of AA scientists/users has been changed drastically. Alternatively, there is no significant difference between the levels of users’ ISB.

**Secondly**, the attitudes, skills and acknowledge (ASK) of the scientists/users are oriented towards the electronic search from printed version in the changing scenario. However, printed documents will be continued and users prefer to access their information as per their convenience place, time, and type of documents and avoid going
to the libraries. Alternatively, there is no significantly difference between level\textsuperscript{1} of ASK in utilizing the ICL resources and services is significantly higher in statistically terms than those who are not using ICL IT based services.

Finally, it is hoped that AA scientists/users still seek the help of library staff to get pinpointed information and avoid garbage. There is a positive impact of IT on ISB of the AA users.

Research Population and Methodology

There are various organizations/institutions offering research academic activities in AA in India. There are twelve important organizations/institutions, offering research /academic activities in the field of Astronomy and Astrophysics (AA) in India. The Inter-University Centre for Astronomy and Astrophysics (IUCAA), which is a leading centre in Astronomy library in India is chosen as main sources, which comes under a forum called Forum for Resources sharing in Astronomy and Astrophysics (FORSA) group (Figure-1.4.3). However, this study included following organizations.

Here population means all members of any well defined class of people, events or objects. The population of this study comprises all of the users from AA organizations/Institutes (FORSA Group), and randomly selected users from department of physics and astrophysics of universities and colleges of India and members of Astronomical Society of India (ASI) (Researcher had attended the 27th Meeting of the Astronomical Society of India, hosted by the Indian Institute of Astrophysics, Bangalore during February 18-20, 2009 and around 300 astronomers/scientists/users working in different astronomy organizations / institutions/ AA dept./colleges in India attended the same. Researcher had interviewed many of them and collected their feedback).

As the total expected population of users was 800, so for selecting research samples Krejcie and Morgan’s Table was applied to determine the sample size for users. According to this table, 166 samples were the appropriate number, which can represent the over all number of 800 of the population. However, more samples (400) were taken, to seek more information and also to obtain better result. Consequently, The total number 400 samples; 400 questionnaires were distributed by post / hosted on internet and requested by e-mails to randomly selected users, which include both male and female
participants from AA organizations/Institutes (FORSA Group) and randomly selected users from Department of Physics and Astrophysics of Universities and Colleges of India and members of Astronomical Society of India. A pilot study was carried out before finalizing the questionnaire, followed by the main study. The response rate is 72% (288/400). For the data interpretation /analysis SPSS version 12.0 was used, while MS-Excel was used for graphic and tabular presentation. According to the outlines laid down for the purpose at the time of developing research plan, and also to achieve its objectives, the data was processed after collection. This included editing, coding, classification, and tabulation of collected data.

Organisation of Thesis

The thesis is organised into five chapters, which are further divided into many sections and subsections. The summary of each section is given as below:

Chapter 1: This deals with general introduction, astronomy and astrophysics – Global scenario, astronomy and astrophysics – Indian scenario, astronomy and astrophysics information centre and libraries in India, FORSA Group, design of the study, statement of the problem /research questions, significance (need) of the study, objectives of the study, hypotheses of the study, scope and limitations of the study, definitions: terms and concepts used and conclusion.

Chapter 2: Deals with review of the literature on the problem at national and international level. The first section (i.e. 2.0) provides general chronological list of review literature on studies/works done on scientists/subjects during 1949- July 2009, supported with references and bibliographies. Section 2.1 deals with review of related works, which provide descriptive account of some main relevant general studies on ISB of users along with their findings, as conducted and reported by the some foreign countries. Section 2.2 provides reviews of directly related studies/works on ISB of AA users along with their findings, as conducted and reported in literature and section 2.3 provides descriptive account of some main relevant general studies on ISB of users along with their findings, as conducted and reported in Indian literature. Some 428 documentary sources were consulted or referred for conducting the review of the present study.

Chapter 3: This chapter contains introduction, design of research method,
formulations of research problem, preparation of research design, design of questionnaire, research population and sample design for pilot study and main study, statistical analysis and interpretation of data and conclusion.

**Chapter 4:** This chapter contains observation, analysis and presentation of data. Data analysis of the responses is explained in details in descriptive statistics with tables and graphs as per sequence of questions (from Part A to Part D). The entire data collections from users are presented in form of 76 tables and 27 graphs to make systematic interpretation according to the questions presented in the questionnaire.

**Chapter 5:** This chapter contains summary (General), major findings (from analysis and interpretation as per sequence of questions, in short) (from Part A to Part D), objectives achieved (described as per presumed objectives, in sequence), hypothesis tested (described as per formulated hypothesis), recommendations (includes proposed model), suggestions for further study, academic value of research, conclusion and list of used references and bibliography.

**Conclusions**

It can be summarized that the present study is of significance to the investigation of ISB of users in field of AA in India. The study has justified its objectives looking at differences and similarities between research areas within AA with regard to ISB including tricks and techniques used for keeping up-to-date their knowledge for various purposes. The future of LISc is more towards access rather than collection and also more users oriented than collection as it has been in the past. Consequently, we must customise our information services to users. The study was undertaken to find out the various aspects of ISB in the field of AA to help its users. However, the study shows that AA ICLs in India are facing with their budgetary crunches and users demand towards online/digital information is increasing. It may be safe to summarize that this digital media/services have become part and parcel of academicians/scientists librarians’ life as more desirable resources. Future depth research related to each component of ISB, need to be studied separately: need of information, access/search of information and effective use of information. It can be concluded that there is an urgent need for serious basic and applied research related to ISB by co-relating every parameters given in the study.