Research and Training Network on Violent Start Formation (RTN-VSF)

MINUTES of First Meeting, held in IoA (Cambridge) on 2003 April 23-24

Present at the meeting:

- Alessandro Bressan (Padova Observatory, Italy)
- Daniel Kunth (Institut d'Astrophysique de Paris, France)
- Daniel Schaerer (Geneva Observatory, Switzerland)
- Richard de Grijs (Univ. of Shefield)
- Uta Fritze von Alvensleben (Univ. of Gottingen)
- Elena Terlevich (INAOE, México)
- Cathy Clark (IoA, United Kingdom)
- Ian Bonnell (Univ. of Saint Andrews)
- Ángeles Díaz (Univ. Autónoma de Madrid, Spain)
- Enrique Pérez (Instituto de Astrofísica de Andalucía, Spain)
- Linda Smith (UCL, UK)
- Roberto Terlevich (INAOE, México)

10:00 Welcoming address

10:05 Introduction (R. Terlevich)

- VSF related projects never funded at European level, only at national level.
- Countries outside the EEC (3erd countries) allowed to participate in the VI FP.
- Main enphasis on training (students) and Transfer of konwledge (postdocs).
- Underlying topics for the scientific case:
  Formation and evolution of galaxies as a key to understand Cosmology
  New facilities for multiwavelength data collection.
  Keyword: EVOLUTION
  Understand physics of the main components: massive young star clusters and their interaction with environment, feedback.
  Most of what we know comes from massive stars, but most of the mass in a system is associated with low mass stars.
  Describe the role of massive stars and their ejecta in understanding galactic evolution.
  The ISM in systems with VSF is highly pressurized. Massive stars and environment affect each other. The behaviour of the cluster is not a linear combination of the components and we need to include non linear effects.
- The proposed network should create favourable conditions for the start of a long term collaboration between partners.

Discussion

- VSF vs disc SF? Probably yes, as we are all biased towards massive stars.

- VSF is many times associated with AGN; do we include them? Watch out, we shouldn't become too broad; but VSF as a mode it applies to wherever it happens. Also, what regulates the different modes? what triggers VSF? environments? Also contents (dust, Z, etc) are probably different.

- Feedback will give the possible connection. Put emphasis in the physics, not in scaling laws.

- Is violent giving the idea of something unusual, too extreme? maybe we should use a different expresion.

- Looking at very low Z (metal) environments, one is going to larger z (redshift) and therefore cluster formation and feedback. Observational cosmology? Of course that is very important, but we have tried to avoid puting much emphasis on high z because other people will be doing it. We really want to concentrate on the nearby universe which is the area that NEEDS support. Of course there will be applications, and the high z universe will be the logical conclusion. Our findings will form the base for high-z understanding.

- Perhaps interaction with other networks could be politically important.

- Doubts are expressed with respect to the critical mass, number of people. It is commented that although there are no restrictions as to the size (nodes and people) or budget, to build a skyscraper you need a sound structure. The EU recomends that we should be ambitious in this sense, as long as we have a very good case.

- Regarding how many people we can realistically expect, there will be a *core* (people doing research and training) and a *halo* (just research), but those in the core will have to support the halo, because we are too fragmented.

- It is agreed to see the physics first and then we'll see what and who is missing, and how the nodes will be organized.

- Politically, it might help the application if we specifically think in a long(er) term beyond the programme, but at the same time we have to aim at ground breaking results in the first ~2 years. (Asked about the longer term perspective, the CSIC Spanish representative in Brussels replies that this is expected from the Networks of Excellence, a tool to which we do not have access because it is only for priority areas. We should ask this question to other national representatives in Brussels.)

11:00 Presentation of participant countries

(This is very schematic. More detailed information is being posted in the web page, and will be updated regularly.)

- **Italy**
  - (PI. A. Bressan) Padova Obs. (but also University department)
  - Bologna (M. Tosi)
  - Trieste (F. Matteucci)

  All sites can give PhD Degrees.

  Main interests:

  Stellar evolution, Galactic Chemical Evolution (GCE), complicated and comprehensive code for stellar population, multiwavelength diagnostics, high resolution spectral synthesis, galaxy formation, globular cluster formation, SNe, core collapse SN, energetics, catalogue of SNe. SFH of resolved stellar populations. Hydro of ISM of dwarf galaxies, 3D simulations of galactic winds in disky dwarfs and their IGM. ICM, abundance patterns, multi-phase chemodynamical models. High z galaxies, DLA systems, etc.

(11:15 Coffee break
11:45 Cont.)

- **France** (D. Kunth) Paris: Meudon, IAP, Saclay,
  - Toulouse
  - Marseille
  -

(Note: PI per node are not clear yet, nore the PI for France, given that Daniel is the PI for the whole network.)

Main interests:

SF, ISM, feedback, galaxian spectrophotometric evolution-stellar population synthesis (PEGASE)-dust extinction and emission; enshrowded SF regions-
SB+AGN, XMM+Chandra,high-z X-ray obscured AGN
z-evolution of SFR
mm-farIR
dwarf galaxies Z, impact of massive star formation in ISM, Lya emitters at high-z
WR stars and AGN activity
Formation and evolution of high mass stars, UV; diagnostics for HII regions and large datasets; physical processes in nebulae;
Tidal dwarfs, History of galaxy formation (IR) ISM in low luminosity dwarfs;
ULX, ULIRGs, XMM-Chandra;
IR-ISO-ISOCAM massive stars and IMF;
observational and instrumentation programmes SIRTF, Herschel, XMM, Integral; formation and evolution of SSC, gravitational interaction; radiative transfer;
Massive stars, Z, and lensed phenomena; low luminosity dwarfs and SB gals at high z;
1st generation (PopIII) like galaxies;
high resolution (~1.5A) stellar library for stellar populations;

instrumentation programmes (EMIR, VLT)
Ly continuum escape fraction;
local and high-z SF activity;
many instrumentation and observational programmes:
GALAXY, VIRMOS, EMIR, Herschel, FUSE (high-z SB), UVES (low-z massive stars)

(COMMENT: not enough effort in CMDs...)

- **Switzerland** (D. Schaerer) (basically Geneva)

  Main interests:

  Massive (and intermediate mass) stars formation and evolution; mass loss, rotation, magnetic fields, interaction with yields, Z, etc;
  stellar winds, non-LTE, line blanketting, nuclesynthesis;
  also pre-SNe;
  calculations (including rotation) gamma-ray domain, connection with INTEGRAL;
  Li, ^{3}He, low mass stars, gl. clusters, local group gals;
  Evolutionary synthesis models, dwarf and SB local galaxies, synthesis code extended to Gamma-ray domain;
  stochastic effects;
  mid-IR spectra and imaging of SF galaxies;
  database of galactic and globular clusters;
  dinamics: N-body, hydro-chemical, formation of clusters and initial phases of SF;
  extragalactic HII regions;
  mid-IR young starbursts,

  Some co-directed Thesis: UNAM, Granada, Meudon, etc

- **UK** (R. de Grijs) Sheffield (4 people) (Sheffield is a EU less favoured region)
  - Cambridge,
  - UCL,
  - St. Andrews

  Main interests:

  interacting and SB galaxies- Star clusters;
  imaging and high resolution spectroscopy
  UV through near IR imaging (with Uta);
  high resolution spectroscopy (with Linda) masses via sigma, IMF;
  mass segregation, binary population;
  massive stellar evolution and inter-relation with feedback, ISM and f(Z);
  fundamental parameters of B stars, massive blue stars;
  Z homogeneities (or otherwise) in local group galaxies;
  stellar atmospheres, photoionization models, dust, IR
  modelling feedback, ioniz.radiation and rad.pressure, dust emission into hydro simulations;
  Dynamics of massive SF (SPH), physical processes, determine masses, IMF, accretion, cluster formation,
  stellar winds including feedback (without radiative transfer)
  non-LTE model atmosph for massive stars - include in SB99, mass loss for WR, include in instantaneous bursts;
  spectral synthesis of WR in SB and massive star populations
  SSP models

- Germany (U. Fritze von Alvensleben) Munich (MPE)
  - Gottingen, (atractive place for students)
  - Viena (?),
  - Bohum, Bohn... Pouldrach (although has not yet answered)

Main interests:

chemo-hydro models (but Hensler is moving to Viena);
molecular physics;
evolutionary synthesis for normal and dwarf galaxies, super star clusters;
self Z enrichment, stellar populations;
IR photometry, BCD, integrated photometry,
tidal dwarfs (with Saclay and Durham),
integrated light and also WR galaxies;
kinematic, galactic chemical evolution, star formation history;
surface brightness profiles decomposition for BCD and tidal dwarfs;
NELG;
X-ray properties of isolated and interacting gals (XMM-Chandra);
internal vs. environmnental instabilities including physics of SF and feedback, SPH and N-body;
observational and instrumental projects that include guaranteed time in VLT and Hobby-Everly telescopes.

Proposed topics:

SB and SFH in dwarfs, surface brightness, CMD, spectroscopy;
is there a fundamental difference between violent and more `normal' SF processes?;
a comparison cluster-vs field SF;

Colaborations with: Granada, IAC, Saclay, Cambridge, and outside...

- Mexico (E. Terlevich) INAOE,
  - IA-UNAM (Mexico City and Ensenada)

Main interests:

Violent star formation, Star formation in elliptical galaxies, Starburst-AGN connection,
Observational cosmology, Fundamental planes, Supervised and unsupervised analysis of megadatasets.
Chemistry of regions of violent star formation;
stellar fabric in the nuclei of active galaxies with different degrees of activity;
star formation history in normal and active galaxies;
interaction between violent star formation, massive stars and the interstellar medium;
primordial abundance of light elements from studies of giant regions of star formation;
HII galaxies as cosmological probes.
Shock waves: Radiation hydrodynamics theory, semianalytic and
numerical methods for the calculation of the shock-wave propagation.
Interstellar medium: Structure, evolution, and energy budget of
the interstellar medium powered by the action of massive stars,
and star clusters.
Supernova remnants, stellar and galactic winds: Numerical
simulations of supernova remnants, stellar winds, superbubbles and
galactic superwinds driven by massive star clusters into
nonuniform interstellar medium. Comparison of numerical models

predictions with observations in HI, H$_{\alpha}$, and X-ray energy bands.
Star formation: The organizing role of mechanical feedback from
massive star clusters and interstellar shells in the formation of
molecular clouds and new generation of stars.
Pulsars and compact stars: high energy emission and evolution;
gamma-ray bursts.
Study of stellar populations in regions of recent star formation;
indicators of recent star formation;
population synthesis models;
star formation history and chemical evolution of ring galaxies.
The evolution of massive stars that end-up creating supernovae with
characteristics similar to the nuclei of Seyfert galaxies:
characterication of the masses of progenitors, energy outputs and
reprocessing of kinetic energy via interaction with the interstellar medium.
The history of star formation in powerful radio galaxies.
(starburst--AGN connection, including the effects of dust)
Dust enshrouded massive star forming galaxies: ULIRGs at low and
high-z. Predictions of the amount of dust and CO emission based on
theoretical modelling and observational constraints at low-z.
Modelling of photoionization regions and massive stars (3D);
O Stars EUV emission and UCHII regions;
modelling dust effect in HII and HI regions and the dust emission (with radiative transfer);
ISO observations and excitation diagnostics to constrain the EUV ionizing emission from massive hot stars;

The next step is to interface the photoionization code with a PDR code, to treat coherently the HII and HI region with a single modelling tool;

Very vigorous postgraduate training programme. 25 have graduated in the last 4 years (Masters and PhDs) and 38 are enroled in the program presently at INAOE. Similar numbers at IA-UNAM.

INAOE is a multidisciplinary research institute (Astrophysics, Electronics, optics and computational sciences) which allows very close interbreeding between the different disciplines. We are now working together with the computational sciences group in a project to handle megadatasets (we started with SLOANE first release). Students, both from computing sciences and from astrophysics, are involved in the project.

The computing sciences group has the following characteristics and research interests:

- It is formed by 16 researchers, all holding PhDs, working along 4 main lines:
  - Pattern recognition and automated learning
  - Natural language processing
  - Computer perception
  - Systems engineering

- They all share common research areas as Image analysis, reconfigured computing, data mining, text mining, computer networks, simulations and modelling, databases, conversational systems, man-machine interfaces, signal processing, information processing, speach recognition, encrypting, etc.

- The group also collaborates with industry in some developing projects.

Apart from the topics relevant to this application, around which there exist long standing successful collaborations between mexican astronomers and different (sometimes overlapping) sets of members of the network, there are two main contributions that we envisage from Mexico:

1- the unique possibility that opens from the LMT (large millimeter telescope) that Mexico is building together with UMASS on top of Cerro La Negra, and which is expected to begin operations around 2004. Mexico is also involved in the GTC telescope (at the level of 5%).

2- the multi-disciplinary character of INAOE that allows, for instance, close interaction with the computing sciences group, as the project we are involved with at present on the analysis of SLOANE data and the `handling' of megadatabases. The close interaction with experts in optics and electronics also opens the interesting possibility for instrument development at the frontier.

(13:15 Lunch break
14:15 Cont.)

- Spain (A. Díaz) Madrid (UAM, LAEFF, Center for Astrobiology, IEM/CSIC),
  - Granada,
  - Tenerife
    (both Granada and Tenerife are considered EU less favoured regions)

Main interests. As well as many of the topics already mentioned,

kinematics, hydro, density structure of star forming regions, starburst galaxies, spiral galaxies, and ellipticals.

model atmospheres for young hot massive stars; high Z HII regions, problems for Z determination (even for low Z regions);
post SB objects, Balmer line absorption profiles at high resolution;

Three Spanish nodes are already linked in a national-scale version of an RTN *Estallidos* (bursts) that is already very successfully working together between the three locations. Funded for three years: 2002-2004.

14:25 Technical aspects of the Program

We should have a WEB page and develop in the next few weeks a well structured programme for training. Temporarily the web page will be hosted at:

`http://www.iaa.csic.es/~eperez/MSFR/MSFR.html`

This call is issued to develop and structure the European Research Area.

Objective: frame in p.5 (HNDBK) == bring together fragmented areas of European research.

Nature: Multidisciplinary & complementary teams === NODE
Structured program of training, etc (p.9 frame 1)

SIZE: must be chosen to best achieve its objectives. Do not be shy, but if you are ambitious justify it well.

FUNDS: ~1500 M for all Marie Curie actions (of which RTN is an aspect) versus 17000 M total funding.

- No specific guidelines for budget.
- pag. 15: typical expected 0.8-several M per RTN project
- 65% of project funds (contracts or stipends, 3 months to 3 yr contract)
  - Training : < 4 yrs from acquiring University undergraduate degree (i.e., typically to make a PhD)
    BULLETS PAG. 10
  - Transfer of knowledge: 4 < t < 10 yr (i.e. typically for people with PhD)
    BULLETS PAG.10-11
- 35% of project funds (networking, overheads, management)
- Up to 7% for management
- 10% overheads
- Can be used for 'observing runs' (prior approval from EU)
- Except for overheads, all these 25% expenses are paid on the basis of ACTUAL expenses incurred (p.28 bottom).

Activities: joint meetings, workshops, secondments of researches between teams

Internet page and synergy with higher education (p.5)

See diagram PAG.7

PARTICIPANTS: organisations in which the members of the research teams are based Represented by the coordinator and scientists-in-charge.
TABLE PAG.13
Third countries: p.14 . Rightfully members, but need strong arguments for funding: their financing is essential to achieve the objectives.

SIZE: no upper limit (p.15)

EVALUATION CRITERIA: pp.33-35

DEADLINE: Nov. 19

15:00 Discussion

The discussion started with some general topics. We decided to leave the scientific discussion and the definition of nodes for after the tea break.

EU gives extra credit for less favoured regions (such as, e.g., Spain, Greece or Portugal). As Spain is already a member of this RTN, it was pointed out that we may seek to include groups from Greece or Portugal. Richard has interest in including Maria Kontizas. We decided not to force the issue, but to follow the normal collaborations.

It was said that, in the section of *weights* (p.35 of the Manual) *interest for the comunity*:

providing a concentration, or focal point for the topic in the comunity, should be the main case.

Why do we want to be in a network?

- good science (we already do that)
- training (OK)
- tools: this WILL BE the added value to the comunity
    - databases,
    - catalogues,
    - tools (something like Starburst99, Cloudy, etc.)
    - theory (")

Training provides the powerful frame for future work, and people can use the combined resources, that are much more than the sum of the individual ones. (A point about synergy, that comes up frequently in the discussion).

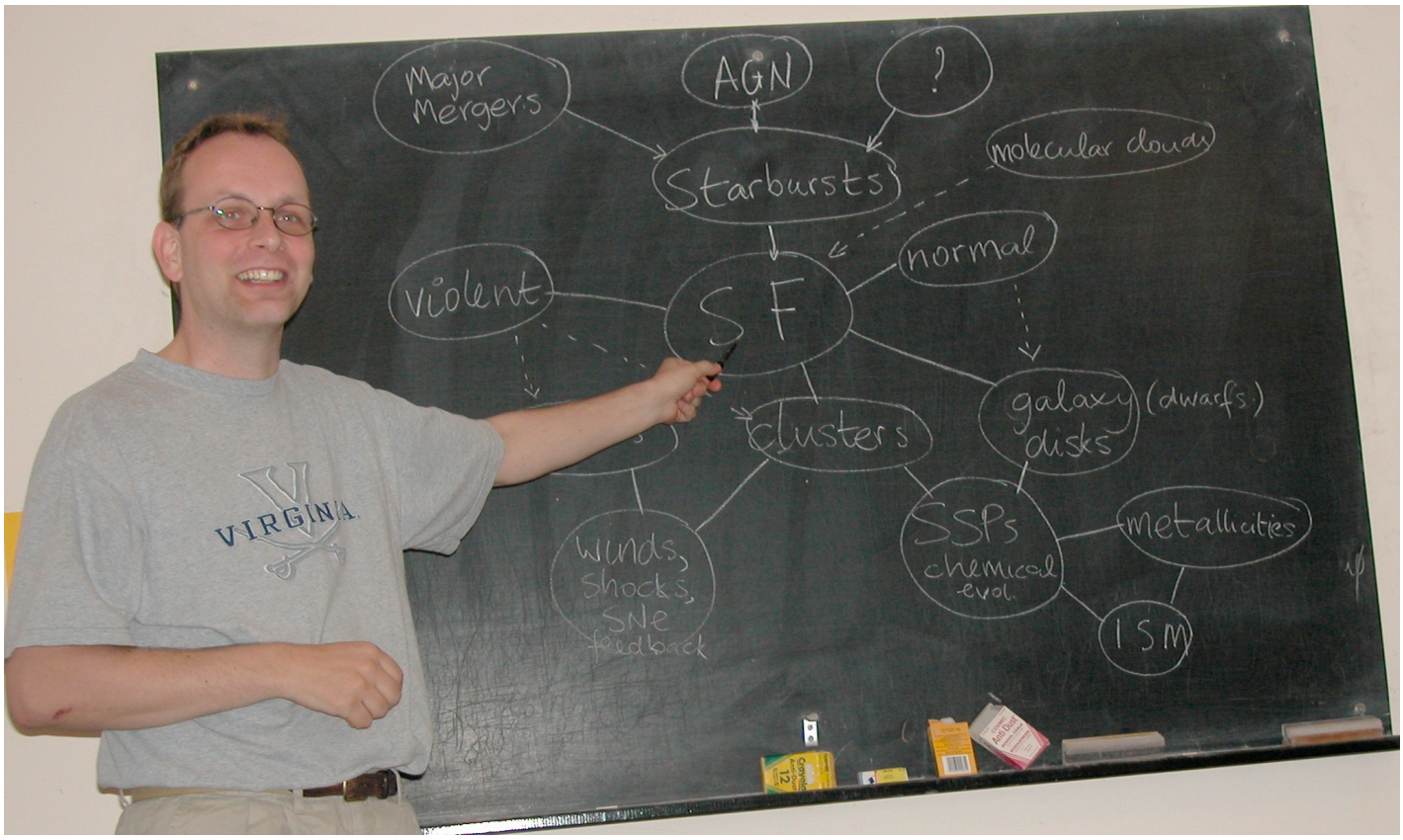
The Network Web page will be a strong source of information. And to implement that one also needs extra resources and expertise => network.

Databases, *interdisciplinarity*, etc. (these concepts came up several times, just as *synergy* also did); e.g. to implement the tools to obtain abundances from emission-lines using 2 or 3 different methods, from a readily accessible site (i.e., an 'abundance calculator').

(15:30 Tea break)

16:00 Discussion on Scientific Case.

- Richard proposed a chart based basically on the physical links between topics, in order to see what or whom were missing.



- Molecular clouds:
  - Who is going to be working in molecular clouds?
  - Francoise Combes, Edith Falgarone, Ph. Andre, MPE... contact these people, try to involve these groups. (Daniel K. to contact the French)
  - At several levels:
    - instrumentation,
    - observations,
    - theory
- What is the physics behind the chart?
  - Separate in terms of levels: physics vs. scaling laws
  - Are we going to start from cloud fragmentation? and internal kinematics of the molecular clouds?

- IMF
- Mass loss, Z, (binaries)
- Low mass stars? as 2nd order, re. to IMF
- Open clusters? If they are young enough and embedded in molecular clouds,
- Progenitors of open or globular clusters?

- WHAT IS MISSING ARE THE QUESTIONS TO ADDRESS
  - e.g. Is the mode of SF universal? or
    - is violent a scaling-up process or something different?
    - does it depend on environment?
    - tidal dwarfs? time evolution in string-like behaviour?
    - what triggers it and what is important?
    - what is a burst?
    - what stops/ends it?
    - are IMF different for violent SF vs. disk SF?
    - is the stellar birth rate (SFR + IMF) universal?
    - can we MEASURE the ages of the young components?
  - There is still evidence that MOST SF occurs in star clusters
  - What is a definition of 'violent' SF?
  - M_* / M_{gas} + feedback strongly influence the subsequent process of SF
  - What shall we call ourselves? Massive stars and violent star formation?
  - Ratio between HII and HI (and H_2) metallicities. Or, in other words, production and mixing of metals.
- Molecular heating, cooling, Z.

- Energetics of SN processes --> feedback, how much of its energy is used to reheat the gas?
- In ionized regions: Photon escape? percentage?
- SFR indicators and their links with time-scales
- Supersonic motions and heating mechanisms in molecular clouds? kinetic temperature?
- Velocity statistics and fragmentation?
- (NOTE: Included after proofs... :-) ... With LMT we will be able to measure CS features at least for galactic objects. CS features, belonging to a denser phase of the molecular gas, are crucial to determine intensity of SF).
- Can we learn something about [alpha/Fe]?
- Promoting targeted surveys is a way to answer these questions. This will have to be included into methods.

18:00 Discussion on the number of nodes.

Things to take into account:

- Money for secondments,
- Money for network meetings
- Money for summer schools, courses, etc.

For that it would be better to have a large number of nodes.

A suggestion to have nodes per topic was dropped, they are to be defined roughly by location.

The distribution in the end will probably be:

- France: 3
- UK: 3 (+1?) (+ associated colaborators from: Greece + The Netherlands)
- Germany: 2 (+ associated from Austria?)
- Spain: 3
- Italy: 2
- Switzerland: 1

- Mexico: 1

Do we need to select PI at the national level? Possibly yes, as it would probably simplify the structure, especially for France.

Can the participants be post-docs or only staff? It is not clearly stated. Find out. (Answer from Spanish representative in Brussels: in principle it doesn't look logical that students are part of the proponent team of a training network (although in pactice we know that students learn from other students. So the answer should be that post-docs are OK as part of the proponent teams, but not students.)

- How are we going to achieve our aims?

  Enrique is going to maintain the Web page (for the moment, until the 1st student is hired). (Note added: a web page for interactive discussion, mailing lists, etc., is being assembled based on Twiki.)

Find out what is the available institutional support, secretarial and others.

18:45 Election of PI

After a very short discussion, it was agreeds that we would benefit greatly from a Comittee as:

PI: Daniel Kunth

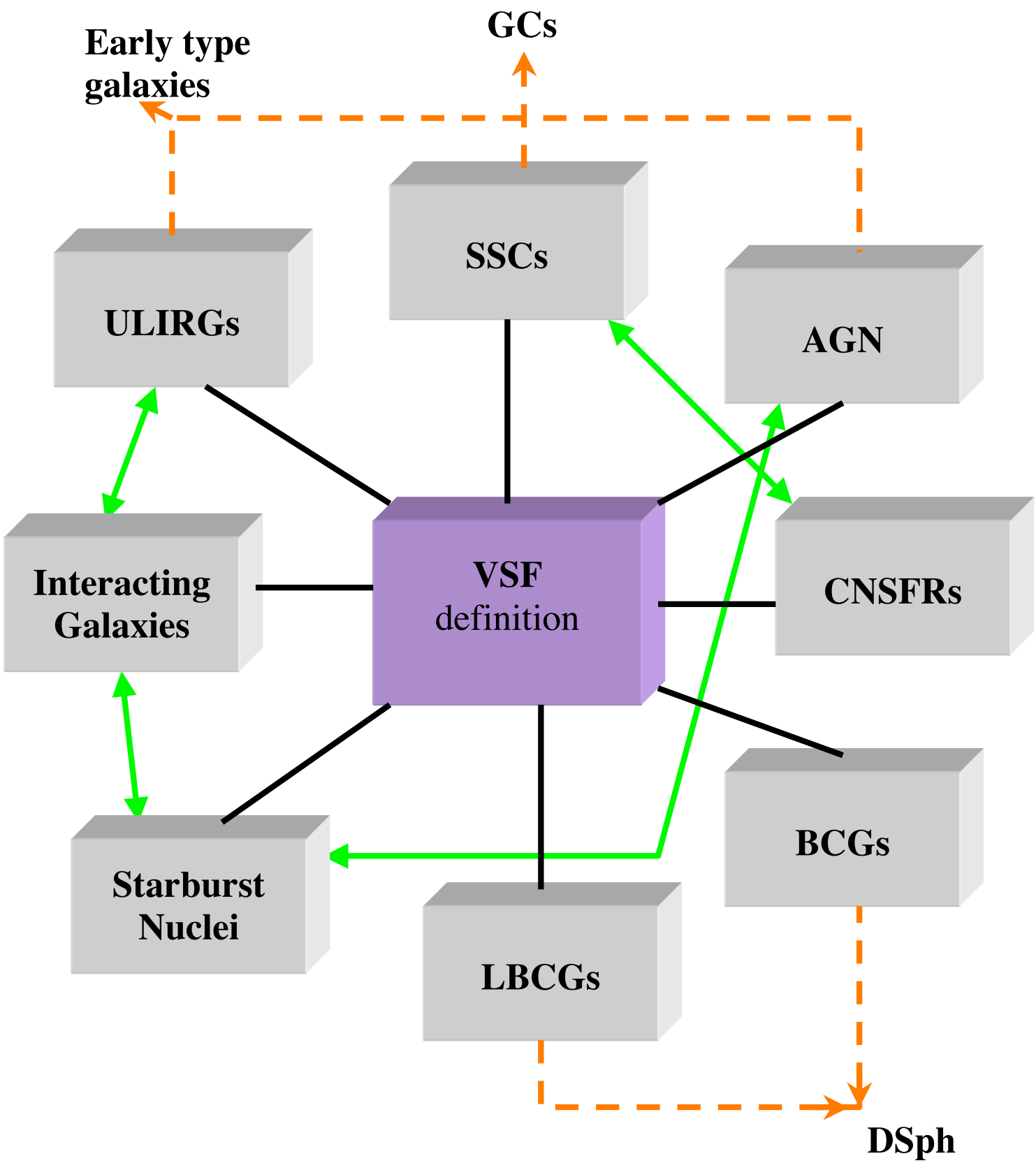
Deputy PI: Richard de Grijs

Strategy support coordinator: Enrique Pérez

If they don't get secretarial support from the Institutes, that can be paid for from the 7% extra.

(19:00 Closing of the session)

Sites of Violent Star (Ángeles diagram)



Full lines: possible connections.
Dashed lines: time evolution.

April 24th, morning session added as it was decided to come down more into the scientific goals and methods.

9:00

Angeles proposed a different chart, that was generally very well received, and that will help us in focusing: it is based on the question: how does VSF take place in different types of objects like BCD, CNHIIR, ULIRGs, AGN, SSC, ...? What do they have in common? In what they differ? One can also try to look at the chart as a hierarchy of objects.

Then, a second dimension to the chart is provided by methods, tools, multi-wavelength and a time component; cosmological evolution may be included later. Each different object type needs to be approached to with all the different tools.

Questions should be developed towards a working scheme.

Do we place `massive stars' in the centre instead of Violent star formation?

Massive stars `regulate' the SF process.

Are we going to solve the IMF? Probably not, but the synergy of the group should allow to look at the problem under a novel angle.

Will we seek interaction with other networks? Perhaps afterwards, first concentrate on the `internal' interaction.

An operational suggestion: start from Angeles' chart and decide which part can every group tackle, and how?

What can each group contribute to understanding it? The students and post-docs will help doing that.

Start with the burning questions and think, under this new light, how are we going to try and answer them.

Example: WR features are seen in all the object types, although they belong to completely different environments.

Remembering who is going to read the proposal, it will be good to start from the fundamental physics on the questions to ask, and then elaborate as to the particular objects, methods, tools, etc, that we are going to use (or develop) in order to solve them. The philosophy (the physics) will be paramount in the presentation of the scientific case. And then the training, the synergy, the added value for the community...

Organize the questions into groups that correspond to similar physical processes.

Once some fundamental questions (3 or 4) are identified, each group should decide what is going to be their contribution to solve them, including tools and methods, probably with sub-questions as well.

Shall we set-up a discussion group or web-page forum? and an e-mail alert system as well?

Personal invitation for those that we haven't included yet because we had forgotten.

Find out about joining to existing winter schools (one of the Tenerife ones? a Saas-Fee one?)

We also commented on next year Guillermo Haro advanced workshop at INAOE, on the same topic as the network. Make it an `official network workshop'. (Roberto, a member of the Directorate of the GH workshops and co-organizer, with Sandro Bressan of this July 2004 one on Massive Star formation, has since talked with Pepe Franco, the Secretary of the Directorate, who agrees on the plan). These working workshops for some 35 participants, are accompanied by a Conference on an akin topic, and Richard suggested that his (planned for September 2004, Cambridge) could be it. There have been some talks after our meeting and things seem to be working well in that direction.

Linda also advertised their Conference in Cancun, November 2003, and their web page: www.star.ucl.ac.uk/clusters. For us to participate, although too early for the network...

Another suggestion was to apply to International time in La Palma and similar programmes at ESO, VLT.

Find out about the deadlines and conditions for applying.
(Later enquiries for La Palma 5% International Time: the CCI secretary informs that the philosophy of the 5% is being re-design at this moment.)

Find out also about the conditions for using data archives.

Summary sketch of key questions

- Can we see differences between the different modes of SF: violent vs more quiescent. (Is the Stellar Birth Rate = SFR*IMF universal?)
    - Universal process?, different physics?, effect of potential well?
    - Sandro cannot maintain the same SF processes to reproduce different types of galaxies; e.g. between E's and ULIRGs.
  - For the range of VSF locations in 'the diagram', integrate Multi-observations, hydro, to address for each:
    - Specific-SBR
    - Feedback
    - SF indicators
- What triggers and stops SF in terms of bursts?
- Does SF depends on environ?
- Origin of supersonic motions in regions of SF. (L,□) universal?
- Massive Stars and Violent Star Formation.
- How do SSC form? What is the link with globular clusters?
- Time scale (mode) of VSF.
- Where does VSF occurs? (were there stars before in the same volume?)
- Metallicity influence.
- Feedback:
  - Is 10^{51} universal?
  - Importance of SB wrt host galaxy's overall SFH.
  - Production, dispersion and mixing of metals.
- Photon leakage.
- SF indicators: compatibility, reliability, …
- Molecular clouds: dust vs kinetic temperature. Structure, fragmentation.

- Where does SF occur?
- How does fragmentation proceed?
- Effects of feedback and metallicity?

Actions

- Daniel and Richard to circulate key-points for each node to `develop' before June. Keep in mind that then is Australia and the holidays.

- It was agreed to hold a meeting on the 11-12th september to advance on the proposal. First option for the location: Paris (Second option: Cambridge).

- Angeles/Richard diagram of SF locations with instrumental/methodological (tools) and techniques dimensions added. Assign names and nodes.
- Produce integrated tools.
- Hierarchical structure of ‘objects’: astronomical, physical and computational techniques.
- Tool: you put in your emission line ratios and out get the abundances.
- Discussion list (online,weekly digest, web interface).
- Distribute minutes
- Distribute summaries from nodes
- Request confirmed initial list of participants
- Make web page
- Keep still a representation at national level
- DK+RdG produce the idea-grid for the nodes to fill in. (two weeks)
- Based on previous, nodes produce the scientific case. (before Sidney)
- 2004: GH on VSF in Tonantzintla (June,RJT+AB) + SB Conference in Cambridge (September,RdG)
- November 21-27: Formation and evolution of young massive clusters. (Cancun,LJS).
- DS: organize a SAAS-FEE school on VSF.
- CMT: organize an IAC winter school.
- ORM 5% International Time.
- ESO long term program.
- Use of HST archive.