

Draft

**EUROPEAN SPACE AGENCY**

**FUNDAMENTAL PHYSICS ADVISORY GROUP**

**LISA Payload Review**

The FPAG, at its seventh meeting on 10 April 1998 at ECT\* in Trento, Italy, was presented with a number of reports on recent developments on LISA. Presentations comprised a discussion of the feasibility of the lower cost spacecraft mission based on three spacecraft; a description of progress in the development of the inertial sensors; a description of the work being carried out on lasers, phase locking and interferometry; and a discussion of payload design including thermal control and the reduction of gravity gradients.

The FPAG considered that progress is very encouraging in all areas:

- there are no problems envisaged with the three spacecraft design as opposed to the six spacecraft system originally envisaged, as practicable strategies for drag-free control, pointing and adjustments of the telescopes have all been developed. There is a reasonable level of redundancy although it is important that in the case of the three spacecraft system one complete spacecraft is not lost.
- the inertial sensors for the drag-free systems are under continuous review and significant progress on optimisation of the internal geometry and avoidance of possible sticking effects has been made
- lasers of suitable design and of potentially acceptable performance have been developed and a very encouraging demonstration of laser phase locking at very low light levels has been carried out.
- a detailed study of the payload design, with particular attention being paid to the mechanics of the mountings and adjustments of the telescope assemblies is well underway and will include thermal and gravity gradient models.

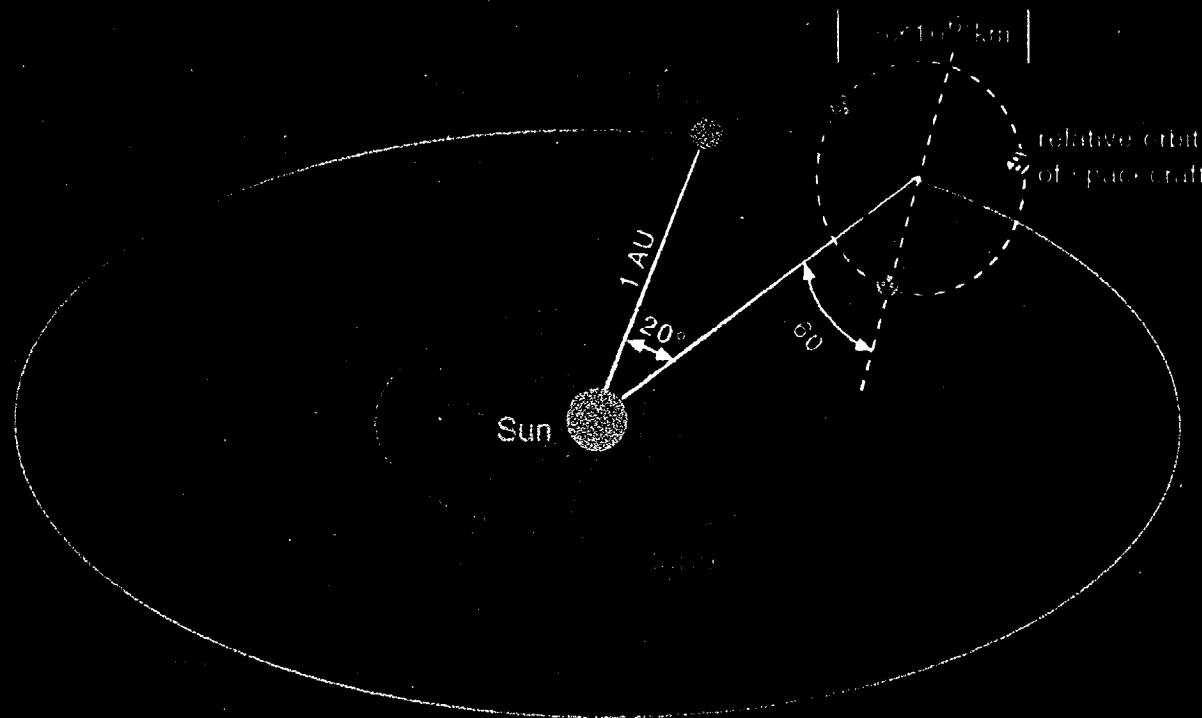
→ The FPAG was also informed about the increase in LISA related activities in the USA, where LISA is included as a candidate future mission within the Structure and Evolution of the Universe (SEU) program. A Pre-Project Office has been set up at JPL and a LISA Mission Definition Team, with European representation, formed. In general, interest in LISA has increased significantly over the last year as the

possibilities of detecting the coalescence of massive black holes and other black hole interactions have become more widely known in the astrophysics community. Other agencies are looking at the possibilities of a space-borne gravity wave mission, launched before 2010, and the FPAG stressed the importance of ESA not losing its leading position in this field.

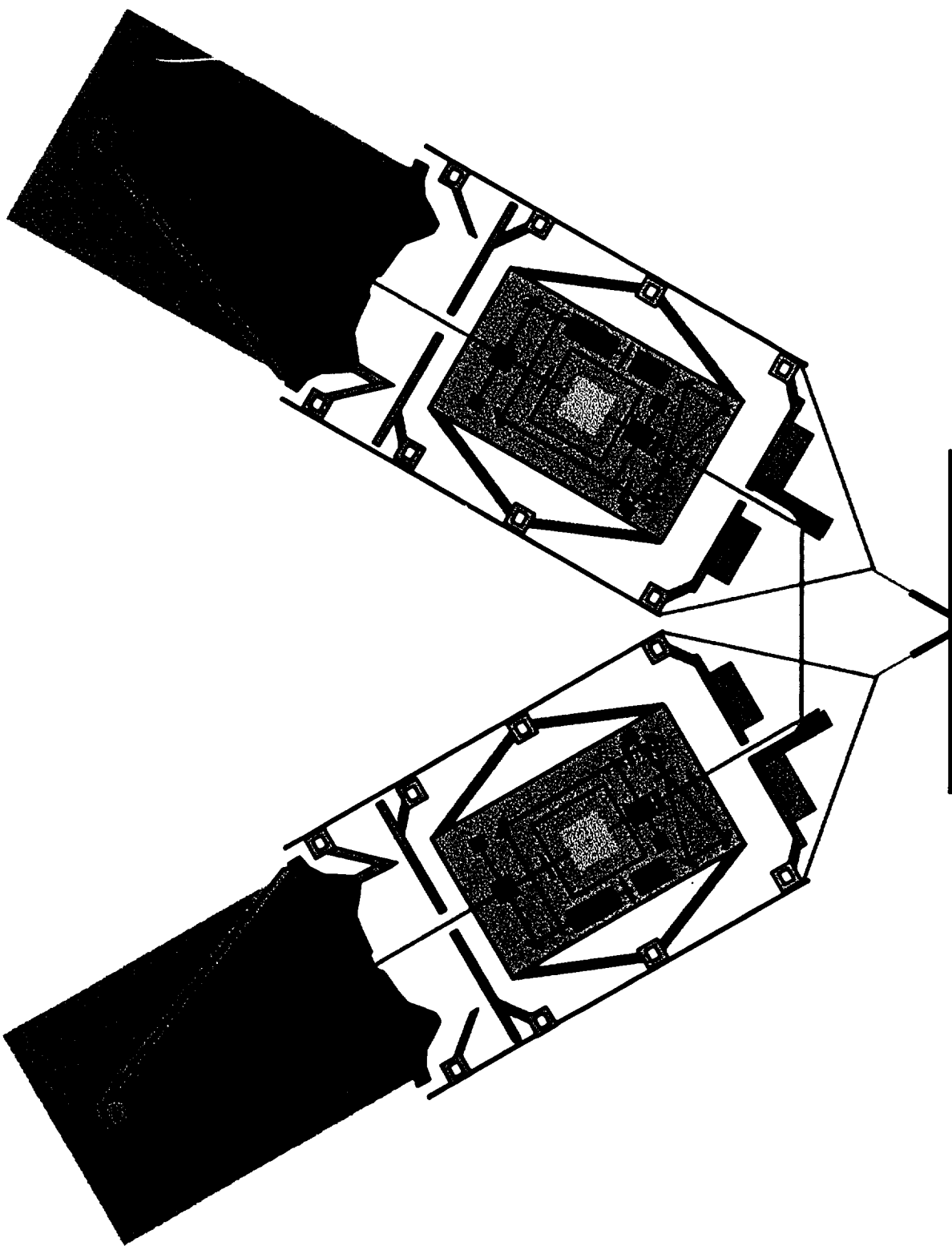
The FPAG concluded that the payload definition and design phase had been very useful and recognised the quality of work carried out by the relevant scientific institutions. It unanimously agreed that the payload has reached a sufficient level of maturity to enter the next phase which is the industrial study at Phase A level. The FPAG recognises that such a study is of considerable value to the field as a whole and recommends that

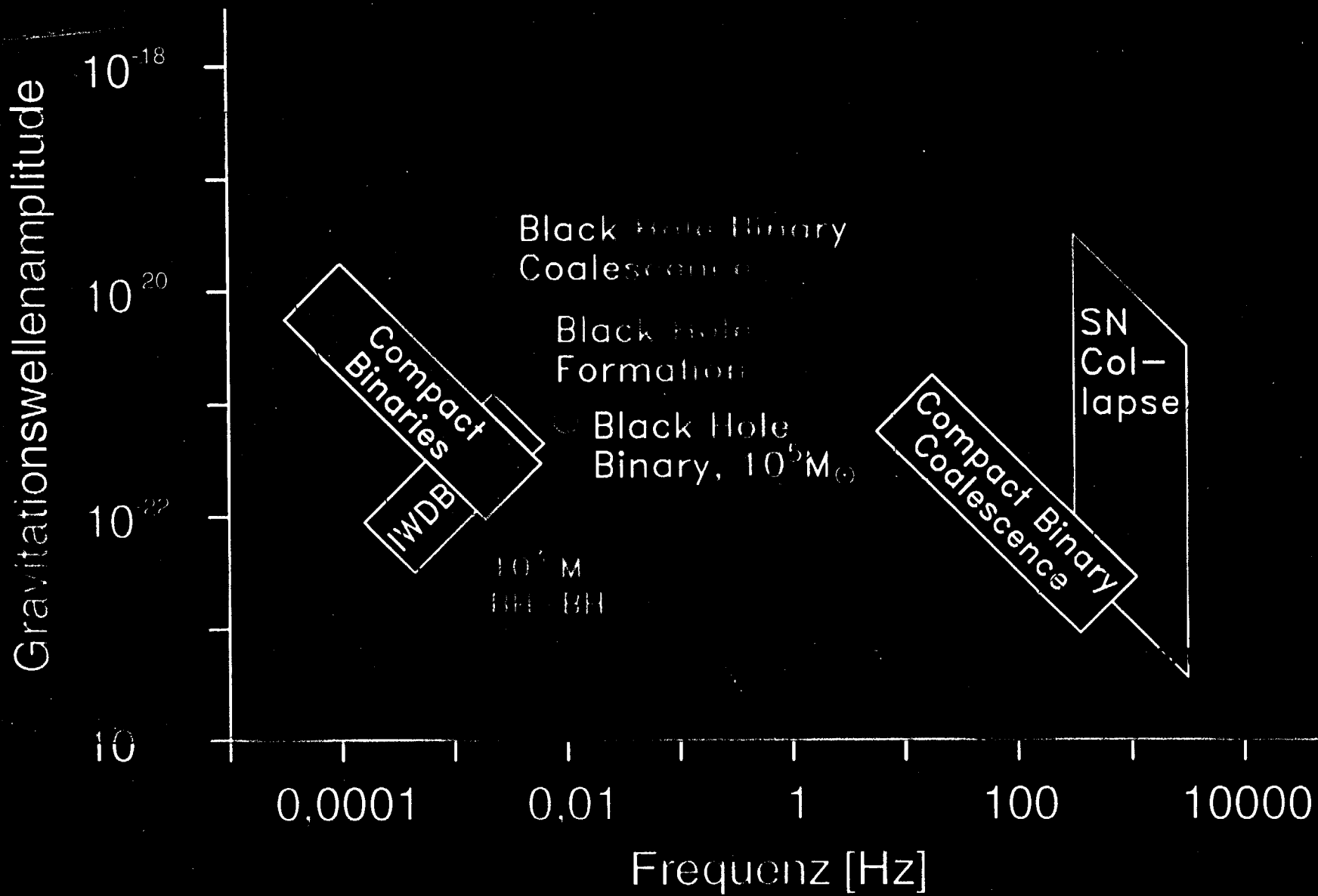
- • the upcoming industrial study should not be carried out in isolation from other ongoing studies on gravitational wave missions; in particular, maximum commonality with ongoing NASA studies of the LISA project would be highly desirable
- contributions on key aspects of the payload should be sought from within the relevant scientific institutions
- • after completion of the industrial study, ESA should explore as soon as possible the feasibility of a collaborative ESA/NASA LISA project with a launch in the 2008 to 2010 time frame and at a cost to ESA which is much lower than currently envisaged levels; this would reflect in an optimal way the interests of the European gravitational wave community.

# LISA: Laser Interferometer Space Antenna









*Note 1, Linda Turner, 04/30/98 11:00:30 AM*  
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