

Science Institute in Baltimore, Livio has the great advantage of having been in close contact with the protagonists of the research he is describing, even if not a protagonist himself, and the reader feels this immediately. And, as a whole, the book brings the latest developments of present-day cosmology to the general reader.

The expansion of the Universe and its geometry, the presence of dark matter, the latest developments in the theory of inflation and the problem of origins are the main topics discussed by Livio. An extended chapter on the origin of life introduces us to his ideas about the anthropic principle, which considers our Universe fine-tuned for life. Livio finds the anthropic principle unconvincing for a number of reasons, among them the lack of predictive power.

He also discusses the methodology of the scientific process and defines a good and valid theory of the Universe. According to Livio, a theory must be beautiful, and he tries to explain this by saying that a theory has to fulfil the requirements of symmetry and simplicity. It must also obey the generalized Copernican principle that the best theories do not need us, as observers, to occupy a privileged position in the Universe in order to be valid. Although this concept about the development of scientific thought is a personal one, it is stimulating to follow Livio's description of how his ideas may or may not be applicable. The introduction of the cosmological constant, for example, could lead to the disappearance of beauty, but only "apparently", according to Livio.

The third theme of the book is the relationship between art and science. As an art enthusiast, Livio is in the position to make comparisons between the scientific process and that which leads to the creation of a work of art. His fascination reflects a wide public interest in this area in recent years. For example, the Venice Conferences on Cosmology and Philosophy, devoted to the themes of "The Beauty of the Universe" and "Art and Science", and the series of meetings on "The Inspiration of Astronomical Phenomena", provide the opportunity for astronomers to engage in direct discussion with artists.

And then there are the great art exhibitions — such as "Cosmos", currently running in Venice at the Palazzo Grassi (following stints in Montreal and Barcelona) — which can be considered as the commentary of artists on the great achievements of cosmology in the past two centuries.

There is only one disappointment with the book: the lack of reproductions of the numerous paintings mentioned in the text. Perhaps this is the book to carry when visiting the appropriate galleries. ■

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## Science in culture

### Angles on angels

**A millennial exhibition of contemporary art at the Castel Sant'Angelo in Rome**

*Martin Kemp*

In this tumultuous year of the Jubilee, Rome inevitably moves forwards by looking backwards. Venerable buildings have been rejuvenated, ancient marbles are restored to view, and once-sleeping museums rise to reassert their cultural richness. In this predominantly retrospective context, it is striking that a structure deeply redolent of the Classical and Christian pasts of the Holy City should be hosting a subtly subversive exhibition of experimental art that (among other things) places new technologies in the forefront of image-making.

The Castel Sant'Angelo, assertively militant in its squat and bulbous mass, possesses an extraordinary history, embodying the essence of Rome. Gigantically constructed as Hadrian's imperial mausoleum, it was spectacularly recast and adorned by successive popes to serve the ballistic science of holy war — with bastions incongruously named after the Evangelists.

Within its stony bowels and sunlit terraces, it now houses "L'Assenza Invadente del Divino" ("The Pervasive Absence of the Divine"), curated by Franco Speroni and Luisa Valeriani, with site-specific works by Haim Steinbach, Joseph Kosuth, Studio Azzurro (a Milan-based group), Grazia Toderi and Ciriaco Campus.

The premise of the show is the presence (or otherwise) of the unknowable, the ineffable, the divine, in an age of scientific certainties and technological mastery. The core resides in a dialectic between the statement attributed to Saint Augustine that "God is better known by not knowing him" and Nietzsche's iconoclastic declaration that "God is dead".

The resolution lies in understanding how and what we are able to see from our constrained perspectives, and what we cannot see or even visualize through our outer and inner faculties of vision. The father-figures of the exhibition are those great inverters of conventional viewpoints, John Cage, one of whose anarchic musical compositions plays in a vaulted space enclosing a large grain mill, and Marcel Duchamp, who 'lectures' us in a cavernous chamber housing a mighty machine for grinding cannon shot.

High on the bright terraces, two coupled works, *La Via Mistica della Tecnologia*, by the 37-year-old Italian artist Grazia Toderi speak eloquently of the issue of perceptual and conceptual perspectives, earthly and heavenly, in complex interplay with the Castello itself. The tone is set by her linear installation of blue



**Grazia Toderi's *La Via Mistica della Tecnologia*, rotating aerial video projection of the Castel Sant'Angelo and its environs.**

lights demarcating the perimeter of the castellations, as if denoting a landing zone at an airport.

The implications are elaborated in a video of a rotating aerial view of the Castello and its environs, subtly manipulated by computer. In the former, we are invited to look upwards, from Earth to heaven, while in the other we stare downwards, courtesy of scientific technologies, from the former perspective of God and his attendant angels. An apparent 'runway' of lights is formed by the illuminations on the bridge over the Tiber. The great bronze angel looming over us at the summit of the fortifications implicitly lands and takes off from the papal aerodrome under the guidance of high-tech control systems.

It is all a question of points of view. From below we see the order of the heavens; from the elevated viewpoint now granted to us by our technologies, we directly see (angel-like) the stellate plan and hidden orders of the city as organism. Toderi's insight is eternally valid, whether in an age of faith or an age of reason. We see what we want to see and can see from our particular viewpoint. The hardest of all perceptual and conceptual tasks is to see the whole picture from another visual and mental place — which is what religions have required of us over the ages. ■

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*"L'Assenza Invadente del Divino" remains at the Castel Sant'Angelo until 31 December.*