FABBRICA DI S. PIETRO
IN VATICANO

BALDACHIN ON THE HIGH ALTAR OF ST. PETER'S BASILICA IN THE VATICAN

SCIENTIFIC RESEARCH

This important part of the work will be carried out with the valuable scientific support of the *Directorate of the Vatican Museums* and in active collaboration with the *Governorate of the Vatican City State*. The necessary diagnostic investigations will therefore be performed by the *Cabinet of Scientific Research applied to Cultural Heritage* of the aforementioned Vatican Museums, under the supervision of Dr. Fabio Morresi.

The exciting challenge surrounding all of the operations that make up the restoration project of one of the most iconic works not only in the history of art, but above all, of our Faith, must include the application of a rigorous and target-oriented protocol of scientific research. The work is complex, not only due to its magnitude and architectural characteristics but especially owing to the peculiar nature of the materials it is made of: it is one of the most elaborate and unique multimaterial works of all times. Marble, bronze, wood of various species, gold, and iron alternate and interpenetrate almost following the sinuous movement of the columns. Naturally, each of these materials will require careful scientific study in order to determine accurately its exact conservation status. At the same time, each material requires precise choices to be made, both in the type of analysis to be performed as well as in the differing types of protocols to be implemented for interventions aimed at the work's preservation. The Cabinet of Scientific Research of the Vatican Museums participates in this adventure with the aim of providing an accurate scientific view, both of the overall state of conservation of the work and of the entire restoration process in all its complexity. The first step will undoubtedly be to define the state of conservation of the artifact accurately. Analyses will be carried out on the substances present on the surface, which have accumulated over centuries of maintenance, and in order to search for any potential states of degradation. Indeed, the maintenance interventions to have been carried out on the work are many and complex. They have all been documented and they range from simple dusting operations to the complete regilding of the baldachin. In the initial phase of research, spectrophotometric measurements will be preferred. These will be performed directly on the surface of the work without any previous material sampling. Analysis using Infrared FT IR and Raman spectrophotometry will be useful to understand the materials which have been

applied, especially organic ones, such as waxes and oily compounds. A subsequent set of XRF fluorescence measurements will provide primary qualitative and quantitative information about metal alloys. Endoscopic analyses, radiographic studies, high-resolution 3D surface surveys and colorimetric measurements will be carried out both during the initial cleaning tests and throughout all restoration operations. Simultaneously, a series of additional scientific investigations which are necessary for a systematic study of the execution techniques of the entire complex will be defined. The exact determination of metal alloys, especially that of the bronze of the columns, will be performed using ICP Mass Spectrometry analysis. This extremely sensitive technique will provide accurate data on both the overall composition of the alloy and, above all, will allow information on trace elements. A statistical study of these elements will form the basis for further comparative analyses. A targeted study will then be conducted on gilding techniques. Scanning Electron Microscopy (SEM), EDS analysis and micro 3D recordings will determine both the technique used for gilding and its state of conservation. Throughout this process, drawing on the extensive historical and documentary records held by the Fabric of St. Peter and studying them will be very useful. The reinterpretation of analytical data in light of the data obtained from historical sources adds a strong scientific connotation to the knowledge acquisition process about the materials present in the Baldachin. At the same time, it can be a guide to understand the processes involved in the Baldachin's construction and how it has been altered.