

### Purpose

GAMAG is a highly sophisticated tool for multipolar identification of magnetic close-range field measurements, its extrapolation to remote locations, and optimization of those far-fields w.r.t. cleanliness requirements by use of compensation techniques. GAMAG provides more specifically:

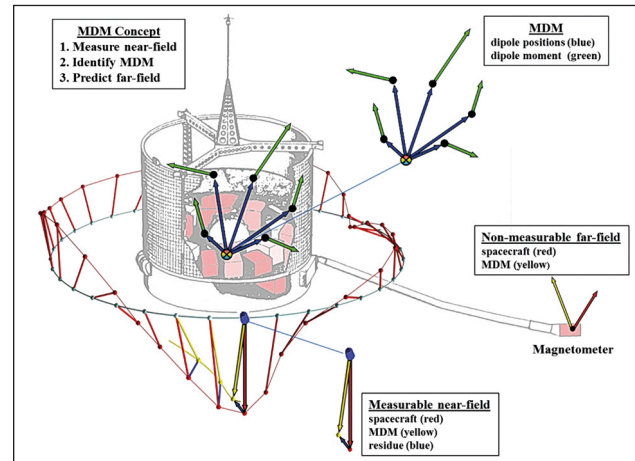
- Derivation of multiple dipole models (MDM) representing accurately close-range field vector or field gradient tensor measurements
- Determination of field vectors and field gradient tensors at remote points of interest
- Multiple magnet models for the compensation of field vectors and/or field gradient tensors at those remote points
- Determination of the global dipole moment of a spacecraft or of spacecraft equipment
- Determination of non-measurable far field of spacecraft
- Compensation of global spacecraft moment of spacecraft to reduce magnetic field at a magnetometer and to fulfil magnetic cleanliness requirements, e.g. of science and exploration missions
- Compensation of global spacecraft dipole moment to reduce AOCS reaction torque due to geomagnetic field
- Examples: Giotto, Ulysses, Cluster, Cassini

### MDM Modelling Performance

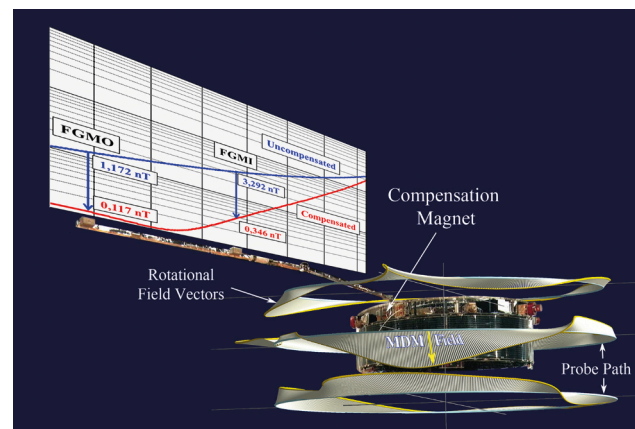
- Operation: fully automatic
- Precision: error < 1 %
- Speed: most complex case < 1 min

### Helmholtz Coil Facility

GAMAG can be delivered together with a (mobile) coil facility for measurement of the magnetic field of spacecraft units.



Concept of multiple dipole model (MDM) method with magnetometer at non-measurable far field point



Cassini before and after field compensation at the outboard magnetometer

### Software Modules

#### GAMAG-B

Field mode computing field vectors at multiple specification points, multiple magnetic dipole model (MDM), global dipole moment and optimal multi-point compensation magnets

#### GAMAG-Bg

Field gradient mode computing same as GAMAG-B with additional gradient information

#### GAMAG-TSUCONF

Optimal test set-up configuration

#### GAMAG-BSIM

Field simulator providing MDM field at multiple points

#### GAMAG-BgSIM

Field gradient simulator providing MDM field gradient at multiple points

#### GAMAG-SSCM

Synthetic spacecraft model providing synthetic spacecraft MDM, field vectors, reverse engineered spacecraft MDM and global spacecraft dipole moment

#### GAMAG-DIMAL

Dipole moment allocation list compliant with specification at 3sigma

#### GAMAG-SAE

Ambiguity error analysis computing maximum of 3-sigma field deviations generated by a population of ambiguous MDMs on a sphere

#### GAMAG-TSUCAL

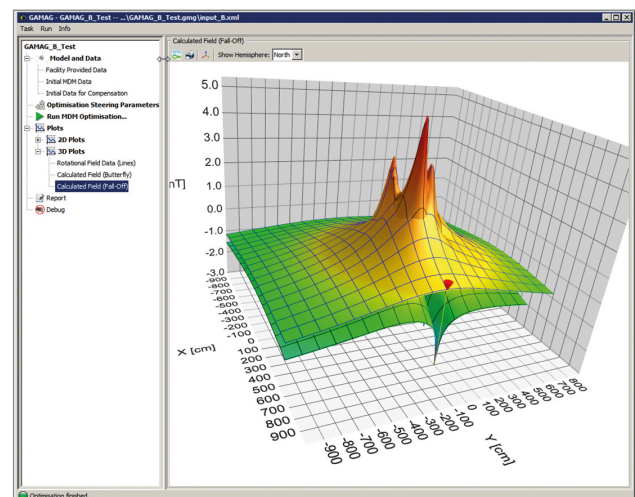
Calibration of test set-up with identification of probe positions

### Features

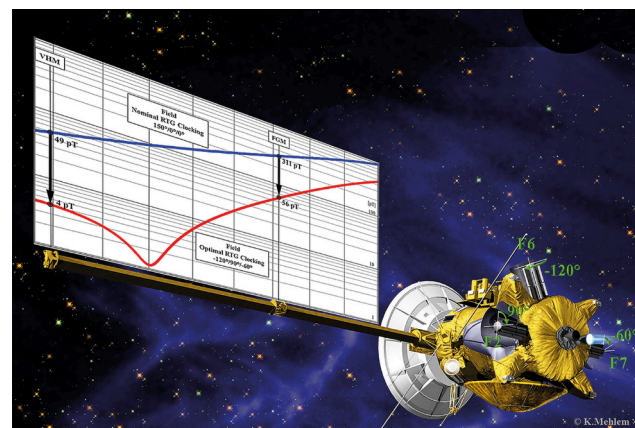
- Graphical user interface with extensive analysis capabilities, interactive graphics and detailed analysis report
- Data acquisition modes: rotational, translational, static
- Automatic determination of minimum number of necessary dipoles

### License Policy

Perpetual node locked or floating license, software updates for one year, initial training in Stuttgart, Germany.



3D interactive data fit plot



3D interactive fall-off plot