Asiago, Catania and Loiano (Italy). The obtained lightcurves span over 22 degrees of phase angle that allow us to obtained a well defined amplitude-phase and magnitude-phase functions. The G coefficient of the phase function is 0.217 which fall in the tipical range of the G values of S type asteroids. The different obtained lightcurves give a sideral period that results equal to $7.042^h \pm 0.001^h$. Binzel and Madras, 1990 (BAAS, this volume) observed Gaspra from Lowell and McDonald Observatories and their data will contribute to this international effort.
The next opposition of 951 Gaspra will occur on May 22th 1991 and we urge a larger participation to our campaign to increase the knowledge of 951 Gaspra, in order to optimize the operation sequence during the fly-by.

21.10

Evolutionary Implications of Compositional Variations Within the S-type and A-type Asteroid Populations

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The S-type asteroids are a diverse population which shows systematic variations with heliocentric distance. The A-type asteroids also exhibit considerable diversity and appear to be the olivine end-member of the S-field. The available 0.3-2.6um spectral (ECAS, 25-filter, 52-channel) and IRAS data for the S- and A-type asteroids has been analyzed to determine mafic mineral abundances and compositions and to estimate metal abundances. These compositional parameters have been used to investigate the thermal and collisional history of the minor planets. A quarter of all S-asteroids were included in the present study. The S-asteroids exhibit a wide variety of mafic silicate assemblages ranging from pyroxene-dominated (pyroxenites, basalts, "mesosiderites") to olivine-dominated (dunites, peridotites, "pallasites"). Olivine-rich mixtures ($1.5 < ol/px < 6$) predominate. Many of the S-asteroids have ol/px ratios similar to ordinary chondrites, but unlike these undifferentiated meteorites, most of the S-objects incorporate significant amounts of Ca-rich pyroxene (cpx) indicating an igneous origin. The A-asteroids include a cpx-bearing subset, analogous to an assemblage intermediate between a braccinite and a nakhlite. The variations in S-asteroid mineralogy as a function of semimajor axis is complex. It shows a general decrease in the olivine/metal abundance ratio with increasing heliocentric distance. The ol/px ratio shows a pattern in which the Kirkwood gaps appear to be important boundaries. The S-asteroids in the Flora and Main Belt zones I, IIa and IIb (Zellner et al., 1985, Icarus 61, 355) have ol/px ratios of 0.20, 0.0-1.0, 0.1-0.5 and 0.0-0.2 respectively. The inner belt (a=2.4AU) S-asteroids are mainly fully-differentiated bodies while those near 2.8AU are mainly partially-differentiated bodies.
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21.11

The A Class Asteroid 1951 Lick

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The Amor asteroid 1951 Lick was observed during its recent favorable apparition at 1.25, 1.65 and 2.2 microns with the Infrared Telescope Facility (IRTF) on Mauna Kea. The extremely red J-H color of Lick indicates a significant amount of olivine on its surface. Lick was not detected at 10 microns. Thus, the unexpectedly low albedo for Lick from the asteroid survey of the Infrared Astronomical Satellite (IRAS) is not confirmed. These results are consistent with the classification of Lick as another of the rare class of A asteroids based on its visual colors by Wisniewski.

This research was carried out at the Jet Propulsion Laboratory, California Institute of Technology with support from the IRTF, Mauna Kea Observatory under contracts with the National Aeronautics and Space Administration.

21.12-T

ROTATION PROPERTIES OF SMALL ASTEROIDS FROM PHOTOELECTRIC OBSERVATIONS

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We are carrying out an observational project on small asteroids ($D \leq 50$) with the aim to study the collisional history of asteroid population. In this paper we report photometric observations obtained for nine small asteroids from August 1984 to January 1989 at La Silla (ESO, Chile) observatory. We determined the rotational periods for six asteroids while for three more objects we obtained a lower precision. The obtained data are reported in the following table.

Asteroid	Period (h)
269 Justitia	16.545
289 Nenetta	06.902
435 Ella	04.623
537 Pauly	16.252
995 Sternberga	16.483
1693 Hertzsprung	08.825
504 Cora	24.06
1186 Turnera	12.01
1392 Pierre	18.06

To have a better understanding of the evolution of small asteroids we reanalised the distribution of all the rotational periods available up to now.

21.13-T

Ground-Based Reconnaissance of Asteroid 951 Gaspra

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Asteroid 951 Gaspra will become the first asteroid encountered by a spacecraft when Galileo flies past in October 1991. We have sought to obtain ground-based reconnaissance of Gaspra in advance of the encounter to assist with the mission planning. Our observations consist of photoelectric photometry obtained with the Lowell Observatory 1.1-m telescope on UT 1990 January 24 and 25 and with the McDonald Observatory 0.91-m telescope on UT 1990 February 21 and 23. From these observations we derive a *synodic* rotation period of 7.043 ± 0.002 hours. The observed lightcurve amplitudes in January and February were 0.47 ± 0.02 and 0.46 ± 0.02 magnitudes, respectively. Our independently derived results are consistent with those reported by Barucci et al. 1990 (*BAAS*, this volume) and our data will be contributed to this international campaign so that the best possible set of parameters can be determined in advance of the encounter.