

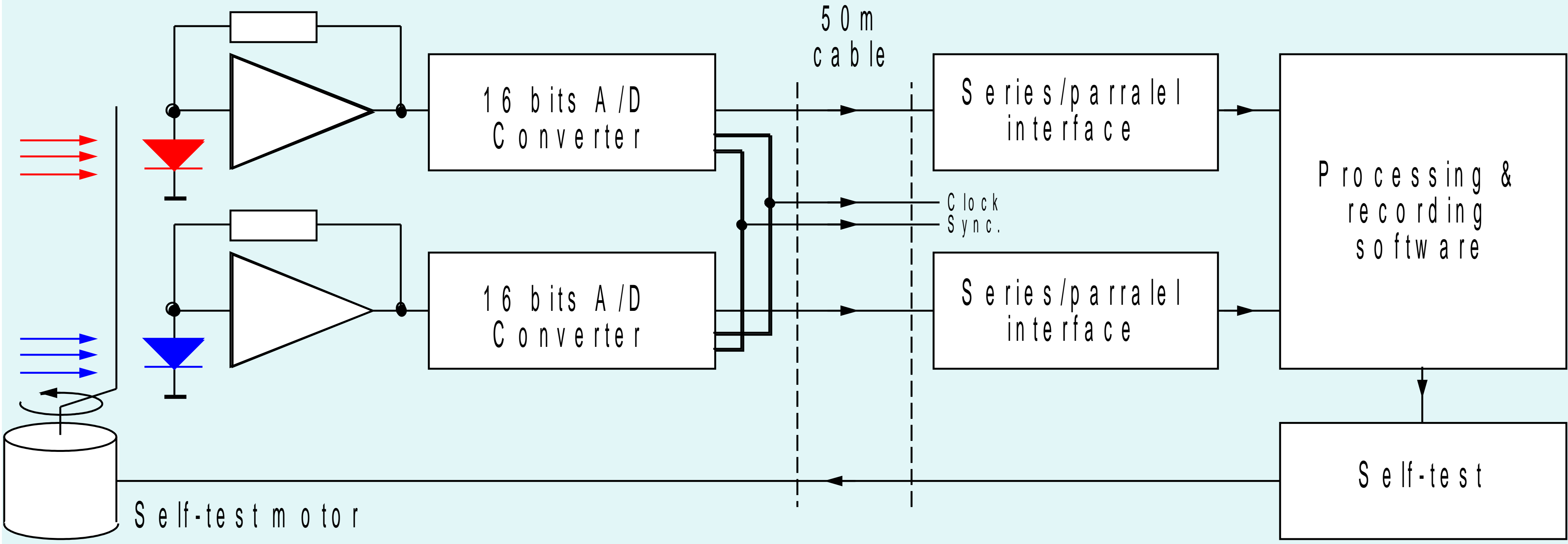
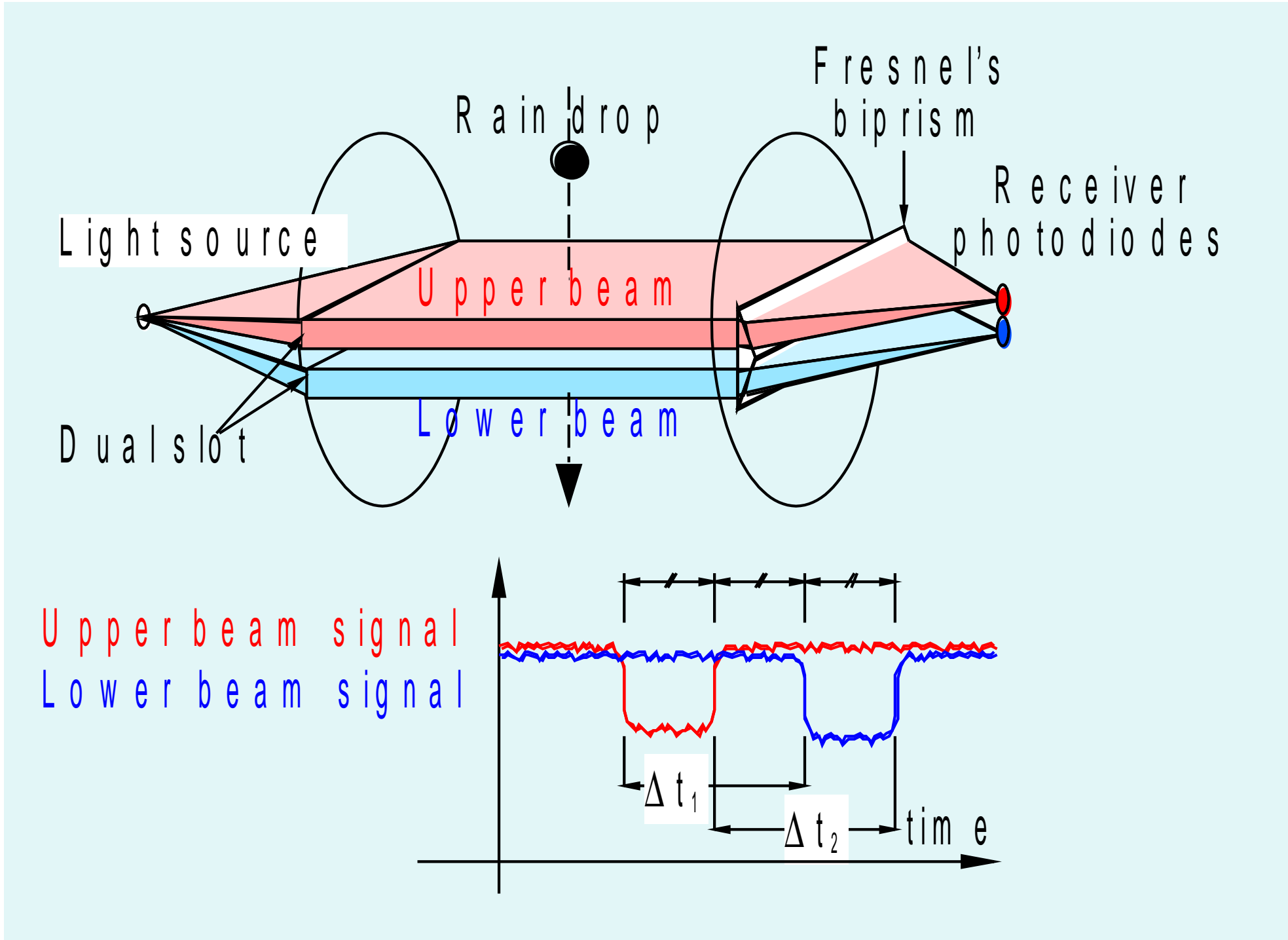
THE NEW DUAL BEAM SPECTROPLUVIOMETER CONCEPT

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OBJECTIVE

A device for extending the measurement range of rain drops distribution to very small drops (0.1mm).

PRINCIPLE



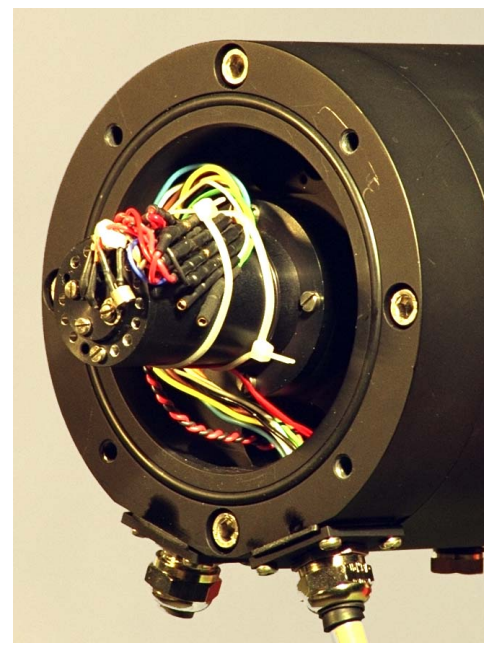
TECHNICAL CHOICES

MEASUREMENT GOALS	METHODS USED
DIAMETER Down to 0.1 mm	<ul style="list-style-type: none">• 2 thin (2 mm) and closely spaced (2 mm) flat beams (L x l = 250 x 40 mm) at $\lambda=0.8\mu\text{m}$.• 16-bit digitization oversampled at 40 kHz and averaged to 10 kHz for noise reduction.• Software :<ul style="list-style-type: none">- slope detection- baseline = averages before and after slope change- correction for drops larger than beam thickness- likelihood test by comparing 2 channels• Quality flag for small diameters.
FALL VELOCITY Optimized	<ul style="list-style-type: none">• Averaging of Δt_1 and Δt_2 (see diagram above).• Interpolation for high velocities.
TIME STAMPING OF DROPS 1 millisecond	<ul style="list-style-type: none">• Clocking: sensor's sampling frequency used between PC times inserted at beginning and end of files.
ERROR REDUCTION <ul style="list-style-type: none">• Sunlight• Water on internal glass windows• Dripping water drops• Wind sensitivity• External splash on sensor body• Internal splash• Condensation	<ul style="list-style-type: none">• Sunlight rejection filter.• Air circulation pump.• Water draining slots above windows.• Very rigid cast iron supporting ring.• Anti-splash circular ribs and scouring rolls.• Internal vanes.• Heated electronics and Moisture absorbers.
ERROR DETECTION <ul style="list-style-type: none">• Self-test for monitoring baselines, synchronization, and window cleanness	<ul style="list-style-type: none">• Reciprocating 0.4 mm diameter rod within beam triggered daily or manually and motor driven. Induced signal variations recorded to self-test file.

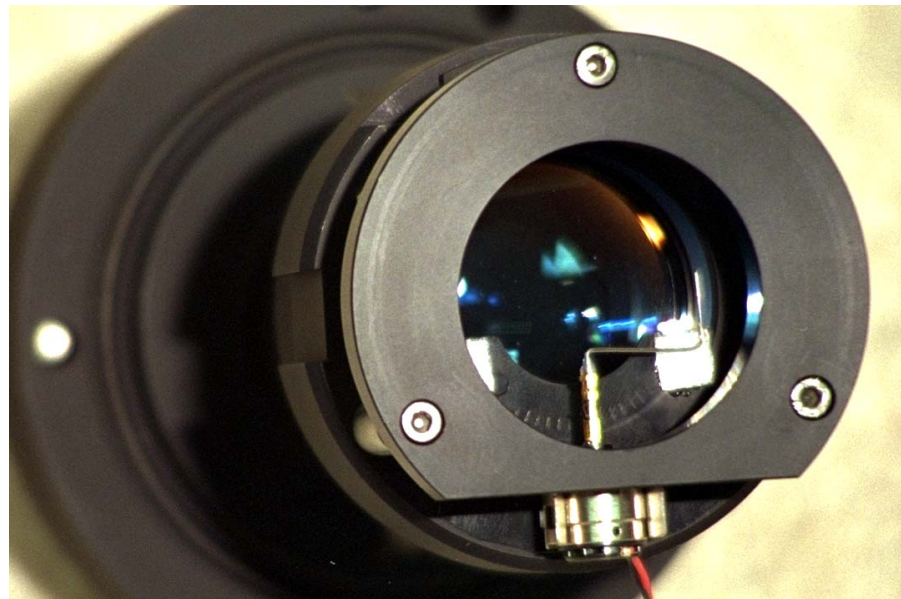
PRESENTATION



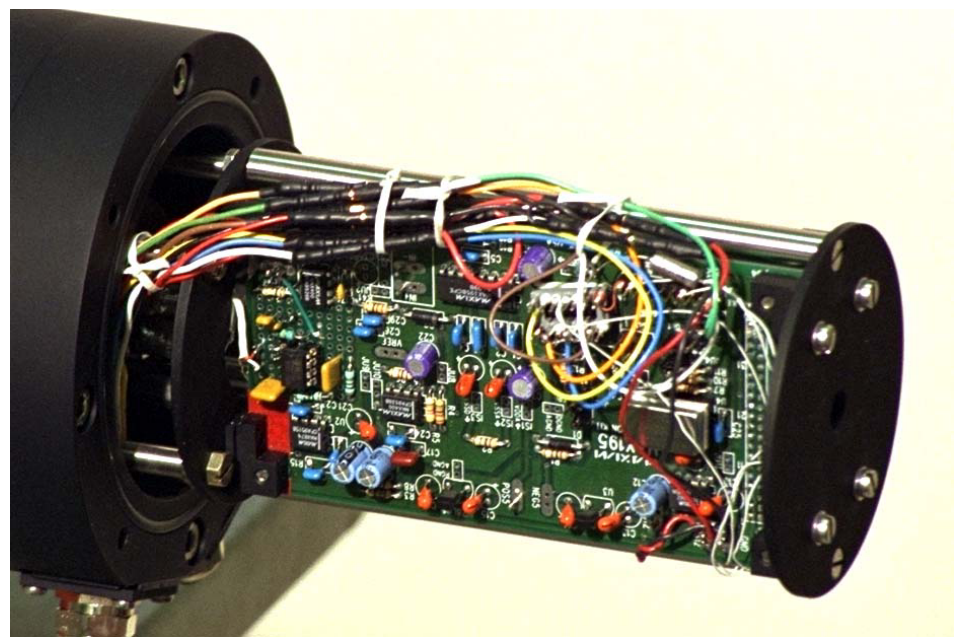
DETAILS



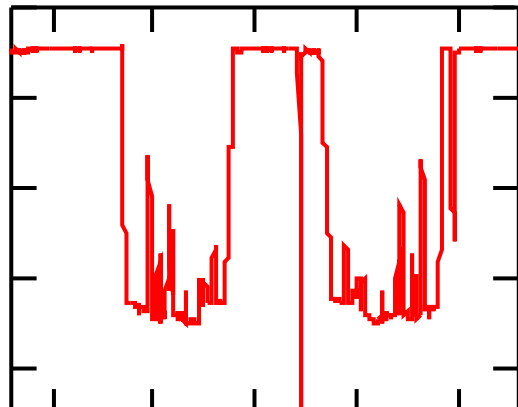
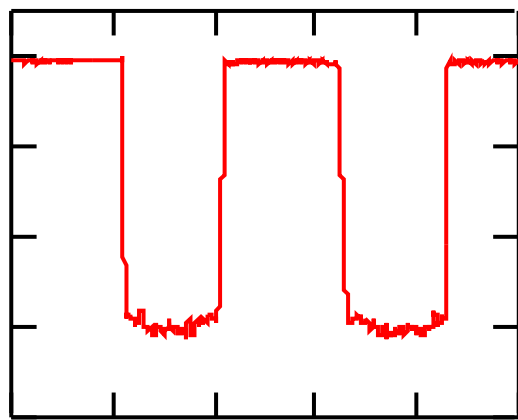
Light source on emitter side



Self test device with its 0.4 mm diameter scanning rod



One of the 2 serial ADC acquisition boards on receiver side



Clean glass windows (top)
and with water deposition (bottom)

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"The new Dual-Beam Spectropluviometer Concept" by "Delahaye, J.-Y.; Barthès, L.; Golé, P; Lavergnat, J.; Vinson, J.P."
scheduled for a poster presentation in Session HSA4.01, Poster Area HS on Monday, 22 April 2002, 18:00.
Poster board number is HS003 and poster may be on display from Monday, 22 April 2002, 8:00 to Monday, 22 April 2002, 20:00.