Plans for 2001A SCP Search

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1 Introduction

This is not meant to be a comprehensive discussion of the Spring 2001A run. Many issues are still open for discussion. Topics which are discussed are those in which I have been actively involved, and which might not be common knowledge within the collaboration. These topics include the planned HST observations, the planned ground-based observations, and most of the details of field selection.

2 HST Observations

We plan to observe five SNe at five lightcurve epochs with HST under GO8585. We hope to have two with $1.0 < z 1.3$ and three with $0.85 < z < 1.0$. The targets must be confined to a 1°radius circle on the sky. The selection of this region is discussed below.

Using a recent hot-pixel map for the PC, I selected a region near pixel 200,200 where our SNe are to be placed. This was done to halve the size of the CTE correction compared to placing the SN at the center of the field. The orientations of the fields should be the same throughout the lightcurve.

For the 1st epoch, the exposures have been split such that two targets can be observed for half an orbit or one target can be observed for a full orbit. This allows us to try more than one SN candidate when we send the first batch of true targets to HST (on Apr 25 by noon EST; to be confirmed). By Monday, Apr 30, we should have committed to a final list of targets. Table 1 lists the HST observations.

3 Ground-based Follow-up

The observing schedule as it is currently known is available at groupwork/observing/cal2001.true. Follow-up telescopes include Keck and VLT for spectroscopy, Gemini and VLT for NIR photometry, and VLT, NTT, TNG, WIYN, and WHT for optical imaging. It is expected that LBL+Hook will cover Keck, Lidman will cover all ESO runs (with whatever assistance he has requested). Gemini will have a queue observer, but our assistance may be required as well. The TNG and WHT time were awarded to Pilar — I don't know her plans for covering the runs but there may be a role for more European involvement in those runs. At WIYN we have been assigned specific nights, suggesting that this time is **NOT** queue-scheduled (note that our April WIYN time is scheduled at the same time as our low-z GCAM time).

4 Field Selection

4.1 The HST Region

I've selected the CFHT/VIRMOS $14^h + 05^\circ$ region as the HST region for the SCP 2001A campaign. Based on the discussion below, this appears to work quite well given our assigned time. Moreover, we will have very deep reference images for one of the fields in this region. It also works well since VLT has restricted us to targets having $RA > 13^h$.

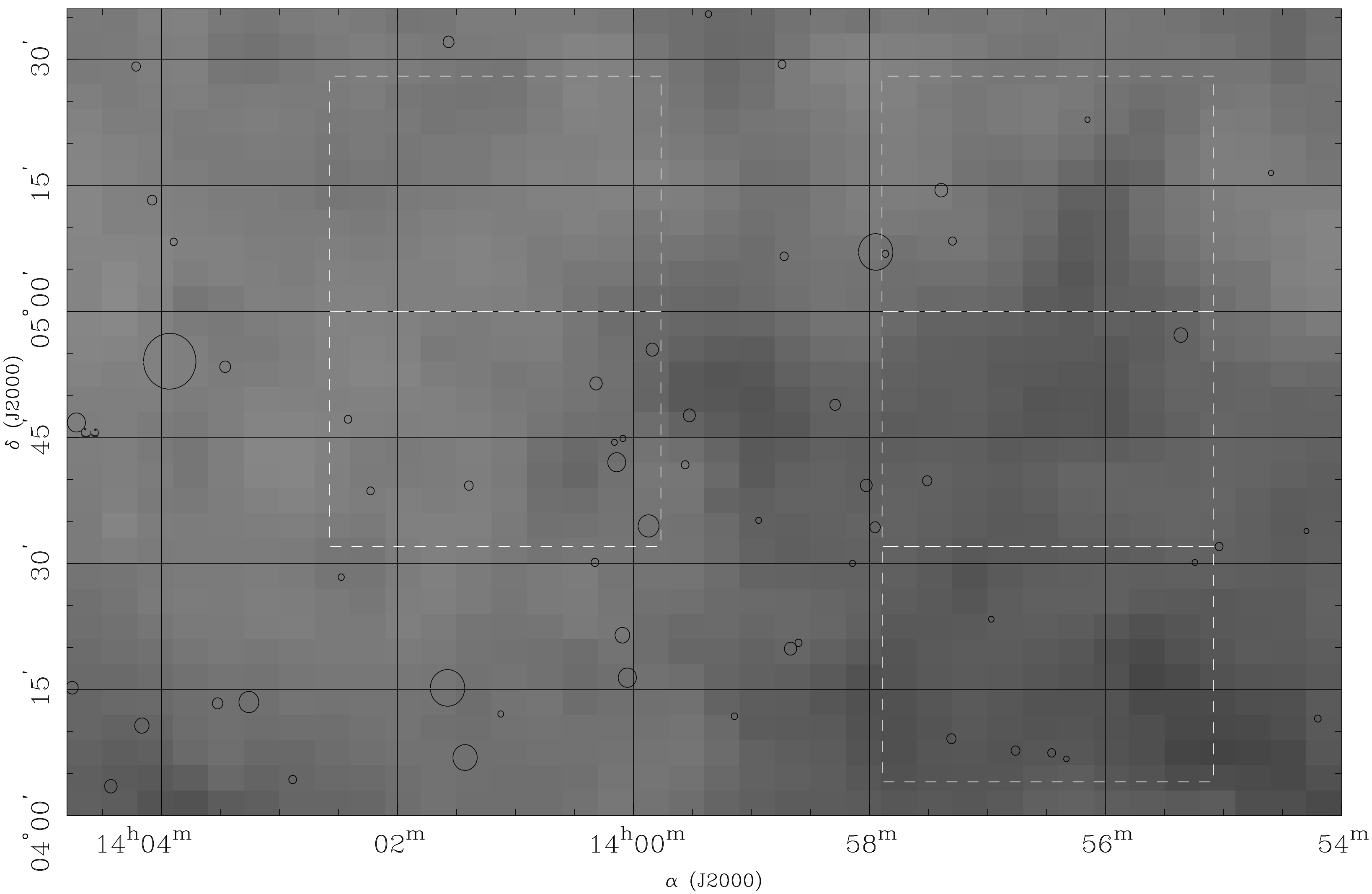
During the search at CFHT, the $14^h + 05^\circ$ region is visible with $X < 1.5$ for about 6.5 hrs. There will be some moonlight (after 4, 5, and 5.5 hrs on field), but the moon will be very low in the sky, and 3rd quarter or later.

During the search at CTIO, the $14^h + 05^\circ$ region is visible with $X < 1.5$ for about 4.7 hrs. There will be some moonlight (after 2.5, 3.5, and 4.5 hrs on field). Here the moon will be more noticeable, but will be 2 to 5 days after 3rd quarter and should not affect the I-band.

During the Keck nights, there will be no moon up when the $14^h + 05^\circ$ region is visible.

Figure 1 shows the individual fields of the $14^h + 05^\circ$ region and bright stars ($m < 10$) superimposed on the corresponding Schlegal, Finkbeiner, and Davis dust map. Note that because the field centers are those of the original VIRMOS imaging observations, which were chosen based on the CFHT 10k imager, I've selected non-adjacent fields so we don't lose areal coverage. The footprint of each CFHT field is $42' \times 28'$. The footprint of MOSAIC is $36' \times 36'$ so the field centers will have to be modified slightly compared to the CFHT values in order to avoid significant loss in areal coverage.

VIRMOS region for 2001A HST field (Black --> E(B−V) = 0.05)



5 The Shallow Search Regions

The above schedule indicates there are about 1.5 hrs at the start of the night, and 1 hr at the end of the night, for shallow search fields at CFHT. However, recall that the CFHT observations will be taken in queue mode. As it turns out, once the readout overhead is included and the total queue time award is considered, there is time for only 7 shallow fields for all of the CFHT search. Note that only 3 of the CFHT shallow fields can be followed at VLT, so of the SNe found in the first 4 shallow fields must be have $z < 0.6$ so non-VLT/non-HST follow-up photometry will be effective. Moreover, for the CFHT fields I did not worry in detail about filling each night at CFHT since a) there will be unavoidable dead time at the end of a full night due to the Galactic plane (which is very wide) b) with queue-scheduled time a "night" doesn't have a special meaning. The fields chosen so far (including the HST-region fields) are given in Table 3.

At CTIO the situation is quite different since the telescope time is awarded in full nights, and the nights will be much longer than we are used to in Chile. At CTIO, there are 3 hrs at the start of the night, and 2 hrs at the end of the night for shallow searching. Since VLT will follow and spectroscopically check most of the shallow-field SNe Ia, additional, shallow fields with optimal southern access need to be selected.

CFHT FIELDS for 2001A (Black --> E(B−V) = 0.15)

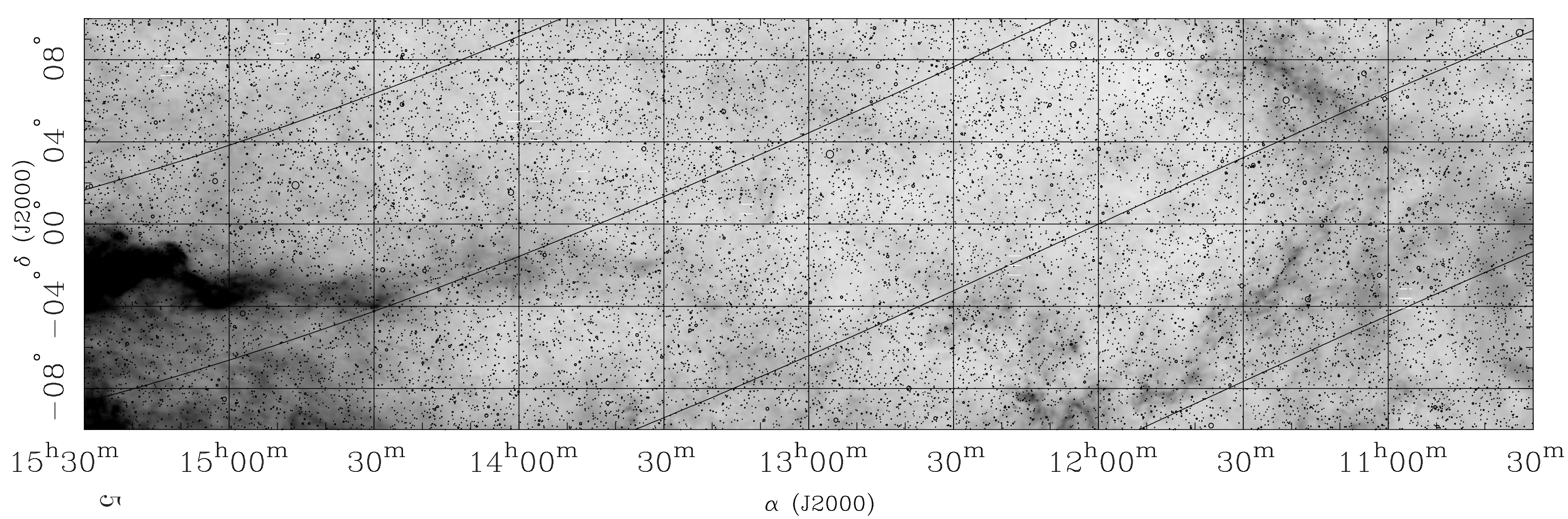


Table 1: $14^h + 05°$ Region during the Search & Follow-up Runs

Target	Date	Filter(s)	Exposure
HIZN1a	04/30 – 05/02	F814W	1 orbit; 2 images/orbit
HIZN1b	04/30 – 05/02	F814W	1 orbit; 2 images/orbit
HIZN1a	05/07 – 05/08	F850LP	3 orbits; 2 images/orbit
HIZN1a	05/11 – 05/13	F814W	2 orbits; 2 images/orbit
HIZN1a	05/21 – 05/24	F814W	2 orbits; 2 images/orbit
HIZN1a	06/04 – 06/07	F814W	3 orbits; 2 images/orbit
HIZN1a	06/18 – 06/21	F814W	3 orbits; 2 images/orbit & 3rd no split.
HIZN2a	04/30 – 05/02	F814W	1 orbit; 2 images/orbit
HIZN2b	04/30 – 05/02	F814W	1 orbit; 2 images/orbit
HIZN2a	05/07 – 05/08	F850LP	3 orbits; 2 images/orbit
HIZN2a	05/11 – 05/13	F814W	2 orbits; 2 images/orbit
HIZN2a	05/21 – 05/24	F814W	2 orbits; 2 images/orbit
HIZN2a	06/04 – 06/07	F814W	3 orbits; 2 images/orbit
HIZN2a	06/18 – 06/21	F814W	3 orbits; 2 images/orbit & 3rd no split.
LOZN1a	04/30 – 05/02	F675W & F814W	1 orbit; no split
LOZN1b	04/30 – 05/02	F675W & F814W	1 orbit; no split
LOZN1a	05/08 – 05/11	F675W & F814W	2 orbits; 2 images/orbit
LOZN1a	05/16 – 05/19	F675W & F814W	2 orbits; 2 images/orbit
LOZN1a	05/24 – 05/27	F675W & F814W	2 orbits; 2 images/orbit
LOZN1a	06/04 – 06/08	F675W & F814W	4 orbits; 2 images/orbit
LOZN2a	04/30 – 05/02	F675W & F814W	1 orbit; no split
LOZN2b	04/30 – 05/02	F675W & F814W	1 orbit; no split
LOZN2a	05/08 – 05/11	F675W & F814W	2 orbits; 2 images/orbit
LOZN2a	05/16 – 05/19	F675W & F814W	2 orbits; 2 images/orbit
LOZN2a	05/24 – 05/27	F675W & F814W	2 orbits; 2 images/orbit
LOZN2a	06/04 – 06/08	F675W & F814W	4 orbits; 2 images/orbit
LOZN3a	04/30 – 05/02	F675W & F814W	1 orbit; no split
LOZN3b	04/30 – 05/02	F675W & F814W	1 orbit; no split
LOZN3a	05/08 – 05/11	F675W & F814W	2 orbits; 2 images/orbit
LOZN3a	05/16 – 05/19	F675W & F814W	2 orbits; 2 images/orbit
LOZN3a	05/24 – 05/27	F675W & F814W	2 orbits; 2 images/orbit
LOZN3a	06/04 – 06/08	F675W & F814W	4 orbits; 2 images/orbit

Table 2: $14^h + 05^\circ$ Region during the Search & Follow-up Runs

Event	Event Time or Duration		
	CFHT	Keck	CTIO
-18 twilight	8:00 PM HST	8:00 PM HST	7:45 PM CST
14h+05d @ X = 1.5	9:30 PM HST	8:55 AM HST	10:40 PM CST
Observing	6.5 hrs	6.3 hrs	4.7 hrs
14h+05d @ X = 1.5	4:00 AM HST	3:15 AM HST	3:20 AM CST
-18 twilight	4:49 AM HST	4:40 AM HST	5:42 AM CST

Table 3: 2001A Search Fields Selected for CFHT

RA (2000)	Dec (2000)	Filter	Exposure (min)	Role	Field Pedigree
10:56:30.00	-03:51:00.0	R	$2 \times 5 = 10$	non-HST	SCP 10:56:30 -03:30:00 field
10:56:30.00	-03:23:00.0	R	$2 \times 5 = 10$	non-HST	SCP 10:56:30 -03:30:00 field
12:17:24.85	-01:46:40.1	R	$2 \times 5 = 10$	non-HST	CFHT 40 min in R
12:17:25.10	-02:14:33.8	R	$2 \times 5 = 10$	non-HST	CFHT 40 min in R
13:12:50.45	+00:43:56.5	R	$2 \times 5 = 10$	non-HST	CFHT 105 min in R
13:47:00.00	+02:20:00.0	R	$2 \times 5 = 10$	non-HST	SCP 13:46:40 +02:10:00 field
13:56:29.20	+04:18:00.0	I	$20 \times 11 = 220$	HST	CFHT 60 min in I
13:56:29.20	+04:46:00.0	I	$20 \times 11 = 220$	HST	CFHT 60 min in I
13:56:29.20	+05:14:00.0	I	$9 \times 11 = 95$	HST	CFHT 60 min in I
14:01:10.27	+04:46:00.0	I	$20 \times 11 = 220$	HST	CFHT 300 min in I (us!)
14:01:10.27	+05:14:00.0	I	$20 \times 11 = 220$	HST	CFHT 87 min
14:49:24.96	+09:01:08.8	R	$2 \times 5 = 10$	non-HST	CFHT 120 min in R
15:12:53.84	+07:27:33.3	R	$2 \times 5 = 10$	non-HST	CFHT 60 min in R