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*Proof.* (i) Is a consequence of Lemma 4.1.3 above.

(ii) Since  $n$  is finite, it is Kähler morphism by 1.3.1(v). We apply 4.2.2 and 4.2.1 to conclude.

**4.2.4. Corollary.** *If  $X$  is compact, then  $\hat{X}$  is Kähler iff  $X$  is weakly Kähler.*

### III. Theorem 2

#### 1. Čech Spaces and Čech Open Sets

**1.1. Definitions.** A (topological or complex-analytic) Čech space will be by definition a pair

$$\underline{X} = (X, \mathcal{X}),$$

where  $X$  is a (topological or complex) space and  $\mathcal{X}$  an open covering of  $X$ . We call  $X$  the *space underlying to  $\underline{X}$*  and always denote both by the same letter. We will deal only with complex-analytic Čech spaces. If  $\mathcal{X} = (X_\lambda)_{\lambda \in A}$ , the  $X_\lambda$  will be called the *elementary open sets of  $\underline{X}$* .

Suppose  $\underline{X} = (X, (X_\lambda)_{\lambda \in A})$  and  $\underline{Y} = (Y, (Y_\mu)_{\mu \in M})$  are two Čech spaces. A morphism

$$F: \underline{X} \rightarrow \underline{Y}$$

will be a pair  $F = (f, \mu)$  where  $f: X \rightarrow Y$  is a morphism in the ordinary sense and  $\mu: A \rightarrow M$  a map such that

$$(1.1.1) \quad X_\lambda \subset f^{-1}(Y_{\mu(\lambda)})$$

for all  $\lambda \in A$ . We call  $f$  the *morphism underlying to  $F$* . We will say that  $F$  is an *open inclusion* if  $f$  is one.

A Čech open set  $\underline{U} \ll \underline{X}$  will be a Čech space whose underlying space is an open subset of  $X$  together with an open inclusion

$$j: \underline{U} \rightarrow \underline{X}.$$

Of course,  $j$  is not uniquely determined by  $\underline{U}$ .

If  $\underline{U}_1 = (U_1, (U_{1,\alpha})_{\alpha \in A_1})$  and  $\underline{U}_2 = (U_2, (U_{2,\beta})_{\beta \in A_2})$  are two Čech open sets of  $\underline{X}$ , define

$$(1.1.2) \quad \underline{U}_1 \cap \underline{U}_2 := (U_1 \cap U_2, (U_{1,\alpha} \cap U_{2,\beta})_{(\alpha,\beta) \in A_1 \times A_2}).$$

Notice that there are two open inclusions

$$j_1, j_2: \underline{U}_1 \cap \underline{U}_2 \rightarrow \underline{X}$$

each factoring through  $\underline{U}_1$  and  $\underline{U}_2$ , respectively.

If  $\underline{X} = (X, \mathcal{X})$  is a Čech space and  $\mathcal{F}$  a sheaf of abelian groups on  $X$ , write

$$C^q(\underline{X}, \mathcal{F}), Z^q(\underline{X}, \mathcal{F}), H^q(\underline{X}, \mathcal{F})$$

for the groups of Čech cochains, cocycles and cohomology classes of degree  $q$  of the covering  $\mathcal{X}$  with coefficients in  $\mathcal{F}$ . Denote by

$$(1.1.3) \quad \varepsilon: H^0(X, \mathcal{F}) \rightarrow C^0(\underline{X}, \mathcal{F})$$