Step	Algorithm: $[C] := \text{SYRK\_AC\_BLK\_VAR3}(A, C)$
1a	$\{C = \hat{C}\}$
4	$A \to \begin{pmatrix} A_L & A_R \end{pmatrix}, C \to \begin{pmatrix} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{pmatrix}$ where $A_R$ has 0 columns, $C_{BR}$ is $0 \times 0$
2	$ \left\{ \left( \frac{C_{TL} \mid C_{TR}}{C_{BL} \mid C_{BR}} \right) = \left( \frac{\widehat{C}_{TL} \mid \widehat{C}_{TR}}{\widehat{C}_{BL} \mid A_R^T A_R + \widehat{C}_{BR}} \right) \right\} $
3	while $n(A_R) < n(A)$ do
2,3	$\left\{ \begin{array}{c c} \left( \frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}} \right) = \left( \frac{\widehat{C}_{TL}   \widehat{C}_{TR}}{\widehat{C}_{BL}   A_R^T A_R + \widehat{C}_{BR}} \right) \wedge n(A_R) < n(A) \end{array} \right\}$
5a	Determine block size $b$ $ \left( \begin{array}{c c} A_L & A_R \end{array} \right) \rightarrow \left( \begin{array}{c c} A_0 & A_1 & A_2 \end{array} \right), \left( \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow \left( \begin{array}{c c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right) $ where $A_1$ has $b$ columns, $C_{11}$ is $b \times b$
6	$\left\{ \begin{array}{c c c} C_{00} & C_{01} & C_{02} \\ C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right) = \begin{pmatrix} C_{00} & C_{01} & C_{02} \\ C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & A_2^T A_2 + \widehat{C}_{22} \end{pmatrix}$
8	$C_{12} = A_1^T A_2 + C_{12}$ $C_{11} = A_1^T A_1 + C_{11}$
7	$ \left\{ \begin{array}{c c c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ C_{20} & C_{21} & C_{22} \end{array}\right) = \left(\begin{array}{c c c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & A_1^T A_1 + \widehat{C}_{11} & A_1^T A_2 + \widehat{C}_{12} \\ C_{20} & C_{21} & A_2^T A_2 + \widehat{C}_{22} \end{array}\right) $
5b	$(A_L   A_R) \leftarrow (A_0   A_1   A_2), \begin{pmatrix} C_{TL}   C_{TR} \\ C_{BL}   C_{BR} \end{pmatrix} \leftarrow \begin{pmatrix} C_{00}   C_{01}   C_{02} \\ C_{10}   C_{11}   C_{12} \\ C_{20}   C_{21}   C_{22} \end{pmatrix}$
2	$ \left\{ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left( \begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) $
	endwhile
2,3	$\left\{ \left( \frac{C_{TL}}{C_{BL}} \middle  C_{TR} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \middle  \widehat{C}_{TR} \right) \land \neg (n(A_R) < n(A)) \right\}$
1b	$\left\{ [C] = \operatorname{syrk\_ac}(A, \widehat{C}) \right\}$

Step	Algorithm: $[C] := \text{SYRK\_AC\_BLK\_VAR3}(A, C)$	
1a	{	
4	where	
2		>
3	while do	
2,3	$\left\{ \begin{array}{c} \wedge \\ \end{array} \right\}$	>
	Determine block size $b$	
5a		
	where	
6		<b>&gt;</b>
8		
7		<b>&gt;</b>
5b		
2		>
	endwhile	
2,3	$\left\{ \begin{array}{c} \\ \\ \end{array} \right. \wedge \neg ( \begin{array}{c} \\ \\ \end{array} )$	>
1b	{	

Step	Algorithm: $[C] := \text{SYRK\_AC\_BLK\_VAR3}(A, C)$
1a	$\{C = \widehat{C}$
4	where
2	
3	while do
2,3	$\left\{ \begin{array}{c} \wedge \end{array} \right.$
	Determine block size $b$
5a	where
6	
8	
7	
5b	
2	
	endwhile
2,3	$\left\{ \begin{array}{ccc} & & & \\ & & & \\ & & & \\ \end{array} \right.$
1b	$\{[C] = \operatorname{syrk\_ac}(A, \widehat{C})$

Step	Algorithm: $[C] := SYRK\_AC\_BLK\_VAR3(A, C)$
1a	$\{C = \widehat{C}$
4	where
2	$\left\{ \left( \frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BL} \end{vmatrix} A_R^T A_R + \widehat{C}_{BR} \right) \right\}$
3	while do
2,3	$\left\{ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left( \begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \wedge \right.$
5a	Determine block size $b$ where
6	
8	
7	
5b	
2	$\left\{ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left( \begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right)$
	endwhile
2,3	$ \left\{ \left( \frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BL} \end{vmatrix} A_R^T A_R + \widehat{C}_{BR} \right) \land \neg ( )  \right\} $
1b	$\{[C] = \operatorname{syrk\_ac}(A, \widehat{C})$

Step	Algorithm: $[C] := \text{SYRK\_AC\_BLK\_VAR3}(A, C)$
1a	${C = \widehat{C}}$
4	where
2	$ \left\{ \left( \frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BL} \end{vmatrix} A_R^T A_R + \widehat{C}_{BR} \right) \right\} $
3	while $n(A_R) < n(A)$ do
2,3	$\left\{ \begin{array}{c c} \left( \frac{C_{TL}}{C_{BL}} \left  \frac{C_{TR}}{C_{BR}} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \left  \frac{\widehat{C}_{TR}}{\widehat{C}_{BR}} \right) \wedge n(A_R) < n(A) \end{array} \right. \right\}$
5a	Determine block size $b$ where
6	
8	
7	
5b	
2	$\left\{ \begin{array}{c c} \left( \frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} C_{BR} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BL} \end{vmatrix} A_R^T A_R + \widehat{C}_{BR} \right) \right\}$
2,3	$ \left\{ \left( \frac{C_{TL}}{C_{BL}} \left  \frac{C_{TR}}{C_{BR}} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \left  \frac{\widehat{C}_{TR}}{\widehat{C}_{BL}} \right  \wedge \neg (n(A_R) < n(A)) \right. \right. $
1b	$\{ [C] = \operatorname{syrk\_ac}(A, \widehat{C}) $ }

$ \begin{array}{c c} 1a & \left\{ C = \widehat{C} \\ \end{array} \right. \\ 4 & A \rightarrow \left( A_L \middle  A_R \right), C \rightarrow \left( \frac{C_{TL}}{C_{BL}} \middle  \frac{C_{TR}}{C_{BR}} \right) \\ & \text{where } A_R \text{ has } 0 \text{ columns, } C_{BR} \text{ is } 0 \times 0 \\ 2 & \left\{ \left( \frac{C_{TL}}{C_{RR}} \middle  C_{RR} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \middle  \frac{\widehat{C}_{TR}}{\widehat{C}_{BL}} \middle  \frac{\widehat{C}_{TR}}{A_R^T A_R + \widehat{C}_{BR}} \right) \\ 3 & \text{while } n(A_R) < n(A) \text{ do} \\ 2,3 & \left\{ \left( \frac{C_{TL}}{C_{BL}} \middle  C_{DR} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \middle  \frac{\widehat{C}_{TR}}{A_R^T A_R + \widehat{C}_{BR}} \right) \wedge n(A_R) < n(A) \right. \\ & \text{Determine block size } b \\ 5a & & & & & & \\ 6 & \left\{ \right. \\ 8 & & & & \\ 7 & \left\{ \right. \\ 5b & & & & \\ 2 & \left\{ \left( \frac{C_{TL}}{C_{BL}} \middle  C_{TR} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \middle  \frac{\widehat{C}_{TR}}{\widehat{C}_{BL}} \middle  \frac{\widehat{C}_{TR}}{A_R^T A_R + \widehat{C}_{BR}} \right) \\ & & & & & \\ endwhile & & \\ 2,3 & \left\{ \left( \frac{C_{TL}}{C_{BL}} \middle  C_{TR} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \middle  \frac{\widehat{C}_{TR}}{\widehat{C}_{BL}} \middle  A_R^T A_R + \widehat{C}_{BR} \right) \wedge \neg (n(A_R) < n(A)) \\ & & & \\ 1b & \left\{ \left[ C \right] = \text{syrk.ac}(A, \widehat{C}) \right. \end{array} \right. \right\} $	Step	Algorithm: $[C] := \text{SYRK\_AC\_BLK\_VAR3}(A, C)$
$ \begin{array}{c} 4 & A \rightarrow \left( A_{L} \middle  A_{R} \right), C \rightarrow \left( \frac{C_{TL}}{C_{BL}} \middle  C_{TR} \right) \\ & \text{where } A_{R} \text{ has 0 columns, } C_{BR} \text{ is 0} \times 0 \\ \\ 2 & \left\{ \left( \frac{C_{TL}}{C_{BL}} \middle  C_{TR} \right) = \left( \frac{\hat{C}_{TL}}{\hat{C}_{BL}} \middle  \frac{\hat{C}_{TR}}{\hat{C}_{BL}} \middle  A_{R}^{T} A_{R} + \hat{C}_{BR} \right) \\ \\ 3 & \text{while } n(A_{R}) < n(A) \text{ do} \\ \\ 2,3 & \left\{ \left( \frac{C_{TL}}{C_{BL}} \middle  C_{TR} \right) = \left( \frac{\hat{C}_{TL}}{\hat{C}_{BL}} \middle  A_{R}^{T} A_{R} + \hat{C}_{BR} \right) \right. \\ \left( \frac{C_{TL}}{C_{BL}} \middle  C_{DR} \right) = \left( \frac{\hat{C}_{TL}}{\hat{C}_{BL}} \middle  A_{R}^{T} A_{R} + \hat{C}_{BR} \right) \\ \\ 5a & \text{where} \\ 6 & \left\{ \right. \\ \\ 8 & \\ 7 & \left\{ \left( \frac{C_{TL}}{C_{TL}} \middle  C_{TR} \right) = \left( \frac{\hat{C}_{TL}}{\hat{C}_{BL}} \middle  A_{R}^{T} A_{R} + \hat{C}_{BR} \right) \\ \\ endwhile & \\ 2,3 & \left\{ \left( \frac{C_{TL}}{C_{DL}} \middle  C_{TR} \right) = \left( \frac{\hat{C}_{TL}}{\hat{C}_{BL}} \middle  \hat{C}_{TR} \right) \wedge \neg (n(A_{R}) < n(A)) \\ \\ \hline 2,3 & \left\{ \left( \frac{C_{TL}}{C_{DL}} \middle  C_{TR} \right) = \left( \frac{\hat{C}_{TL}}{\hat{C}_{BL}} \middle  \hat{C}_{TR} \right) \wedge \neg (n(A_{R}) < n(A)) \\ \\ \end{array} \right. \\ \\ \\ + \left( \frac{C_{TL}}{C_{BL}} \middle  C_{DR} \right) = \left( \frac{\hat{C}_{TL}}{\hat{C}_{BL}} \middle  \hat{C}_{TR} \right) \wedge \neg (n(A_{R}) < n(A)) \\ \\ + \left( \frac{C_{TL}}{C_{BL}} \middle  C_{DR} \right) = \left( \frac{\hat{C}_{TL}}{\hat{C}_{BL}} \middle  \hat{C}_{TR} \right) \wedge \neg (n(A_{R}) < n(A)) \\ \\ + \left( \frac{C_{TL}}{C_{BL}} \middle  C_{DR} \right) = \left( \frac{\hat{C}_{TL}}{\hat{C}_{BL}} \middle  \hat{C}_{TR} \right) \wedge \neg (n(A_{R}) < n(A)) \\ \\ + \left( \frac{C_{TL}}{C_{BL}} \middle  C_{DR} \right) = \left( \frac{\hat{C}_{TL}}{\hat{C}_{BL}} \middle  \hat{C}_{TR} \right) \wedge \neg (n(A_{R}) < n(A)) \\ \\ + \left( \frac{C_{TL}}{C_{TL}} \middle  C_{TR} \right) \wedge \neg (n(A_{R}) < n(A)) \\ \\ + \left( \frac{C_{TL}}{C_{TL}} \middle  C_{TR} \right) \wedge \neg (n(A_{R}) < n(A)) \\ \\ + \left( \frac{C_{TL}}{C_{TL}} \middle  C_{TR} \right) \wedge \neg (n(A_{R}) < n(A)) \\ \\ + \left( \frac{C_{TL}}{C_{TL}} \middle  C_{TR} \right) \wedge \neg (n(A_{R}) < n(A)) \\ \\ + \left( \frac{C_{TL}}{C_{TL}} \middle  C_{TR} \right) \wedge \neg (n(A_{R}) < n(A)) \\ \\ + \left( \frac{C_{TL}}{C_{TL}} \middle  C_{TR} \right) \wedge \neg (n(A_{R}) < n(A)) \\ \\ + \left( \frac{C_{TL}}{C_{TL}} \middle  C_{TR} \right) \wedge \neg (n(A_{R}) < n(A)) \\ \\ + \left( \frac{C_{TL}}{C_{TL}} \middle  C_{TR} \right) \wedge \neg (n(A_{R}) < n(A)) \\ \\ + \left( \frac{C_{TL}}{C_{TL}} \middle  C_{TR} \right) \wedge \neg (n(A_{R}) \wedge \neg (n$		$\{C = \widehat{C}\}$
$ \begin{cases}                                   $	4	$A  ightharpoons \left( \left. A_L \right  A_R \right) , C  ightharpoons \left( \left. \left. \frac{C_{TL}}{C_{BL}} \right  C_{TR} \right)  \right)$
	2	$\left\{ \begin{pmatrix} C_{TL} & C_{TR} \\ C_{BL} & C_{BR} \end{pmatrix} = \begin{pmatrix} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{pmatrix} \right\}$
Determine block size $b$ substitutes $b$ Determine block size $b$ where $ \begin{cases} 6 \\ \begin{cases} 8 \end{cases} \end{cases} $ $ 7 \\ \begin{cases} 5b \end{cases} $ $ 2 \\ \begin{cases} \left(\frac{C_{TL}}{C_{BL}}   C_{TR} \\ C_{BL}   C_{BR}\right) = \left(\frac{\widehat{C}_{TL}}{\widehat{C}_{BL}}   \frac{\widehat{C}_{TR}}{A_R^T A_R + \widehat{C}_{BR}}\right) \end{cases} $ endwhile $ 2.3 \\ \begin{cases} \left(\frac{C_{TL}}{C_{BL}}   C_{TR} \\ C_{BL}   C_{BR}\right) = \left(\frac{\widehat{C}_{TL}}{\widehat{C}_{BL}}   \frac{\widehat{C}_{TR}}{A_R^T A_R + \widehat{C}_{BR}}\right) \land \neg (n(A_R) < n(A)) \end{cases} $	3	while $n(A_R) < n(A)$ do
$\begin{array}{c} 5a \\ \hline \\ 6 \\ \hline \\ 8 \\ \hline \\ 7 \\ \hline \\ 2 \\ \hline \\ 2 \\ \hline \\ \begin{cases} \frac{C_{TL}}{C_{TR}} \frac{C_{TR}}{C_{BL}} - \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \frac{\widehat{C}_{TR}}{\widehat{C}_{BL}} A_R^T A_R + \widehat{C}_{BR} \\ \hline \\ 2,3 \\ \hline \\ \begin{cases} \frac{C_{TL}}{C_{BL}} \frac{C_{TR}}{C_{BL}} - \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \frac{\widehat{C}_{TR}}{\widehat{C}_{BL}} A_R^T A_R + \widehat{C}_{BR} \\ \hline \\ 2,3 \\ \end{cases} \\ \begin{pmatrix} \frac{C_{TL}}{C_{BL}} \frac{C_{TR}}{C_{BL}} - \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \frac{\widehat{C}_{TR}}{A_R^T A_R + \widehat{C}_{BR}} \\ A_R^T A_R + \widehat{C}_{BR} \\ \end{pmatrix} \land \neg (n(A_R) < n(A)) \end{array}$	2,3	$\left\{ \begin{array}{c c} \left( \frac{C_{TL}}{C_{BL}} \middle  C_{TR} \\ C_{BL} \middle  C_{BR} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \middle  \widehat{C}_{TR} \\ \widehat{C}_{BL} \middle  A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \wedge n(A_R) < n(A)$
where $ \begin{bmatrix} 6 \\ 8 \end{bmatrix} $ $ \begin{bmatrix} 7 \\ C_{TL} \\ C_{R} \\ C_{BL} \end{bmatrix} C_{R} C_{R$		Determine block size $b$
$ \begin{cases} 8 \\ 7 \\ \begin{cases} C_{TL}   C_{TR} \\ C_{BL}   C_{BR} \end{cases} = \left(\frac{\hat{C}_{TL}   \hat{C}_{TR}}{\hat{C}_{BL}   A_R^T A_R + \hat{C}_{BR}}\right) \\ \end{aligned} $ endwhile $ 2,3 \\ \begin{cases} \left(\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}\right) = \left(\frac{\hat{C}_{TL}   \hat{C}_{TR}}{\hat{C}_{BL}   A_R^T A_R + \hat{C}_{BR}}\right) \land \neg (n(A_R) < n(A)) \end{cases} $	5a	
$ \begin{cases} 8 \\ 7 \\ \begin{cases} C_{TL}   C_{TR} \\ C_{BL}   C_{BR} \end{cases} = \left(\frac{\hat{C}_{TL}   \hat{C}_{TR}}{\hat{C}_{BL}   A_R^T A_R + \hat{C}_{BR}}\right) \\ \end{aligned} $ endwhile $ 2,3 \\ \begin{cases} \left(\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}\right) = \left(\frac{\hat{C}_{TL}   \hat{C}_{TR}}{\hat{C}_{BL}   A_R^T A_R + \hat{C}_{BR}}\right) \land \neg (n(A_R) < n(A)) \end{cases} $		where
8 $ \begin{array}{c}                                     $		
$ \begin{array}{c c} \hline  & & \\ \hline $	6	
5b $ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} = \left( \begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) $ endwhile $ \begin{array}{c c} C_{TL} & \widehat{C}_{TR} \\ \widehat{C}_{BL} & \widehat{C}_{TR} \\ \hline C_{BL} & \widehat{C}_{TR} \\ \hline C_{BL} & \widehat{C}_{RR} \\ \end{array} \wedge \neg (n(A_R) < n(A)) $	8	
5b $ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} = \left( \begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) $ endwhile $ \begin{array}{c c} C_{TL} & \widehat{C}_{TR} \\ \widehat{C}_{BL} & \widehat{C}_{TR} \\ \hline C_{BL} & \widehat{C}_{TR} \\ \hline C_{BL} & \widehat{C}_{RR} \\ \end{array} \wedge \neg (n(A_R) < n(A)) $		
$ 2 \left\{ \left( \frac{C_{TL}}{C_{BL}} \middle  C_{TR} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \middle  \widehat{C}_{TR} \right) \\ \text{endwhile} \right. $ $ 2,3 \left\{ \left( \frac{C_{TL}}{C_{BL}} \middle  C_{TR} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \middle  \widehat{C}_{TR} \right) \land \neg (n(A_R) < n(A)) \right. $	7	{
$ 2 \left\{ \left( \frac{C_{TL}}{C_{BL}} \middle  C_{TR} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \middle  \widehat{C}_{TR} \right) \\ \text{endwhile} \right. $ $ 2,3 \left\{ \left( \frac{C_{TL}}{C_{BL}} \middle  C_{TR} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \middle  \widehat{C}_{TR} \right) \land \neg (n(A_R) < n(A)) \right. $		
$ 2 \left\{ \left( \frac{C_{TL}}{C_{BL}} \middle  C_{TR} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \middle  \widehat{C}_{TR} \right) \\ \text{endwhile} \right. $ $ 2,3 \left\{ \left( \frac{C_{TL}}{C_{BL}} \middle  C_{TR} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \middle  \widehat{C}_{TR} \right) \land \neg (n(A_R) < n(A)) \right. $		
endwhile $2,3  \left\{ \left( \frac{C_{TL}}{C_{BL}} \left  \frac{C_{TR}}{C_{BR}} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \left  \frac{\widehat{C}_{TR}}{\widehat{C}_{BR}} \right) \wedge \neg (n(A_R) < n(A)) \right. \right.$	5b	
endwhile $2,3  \left\{ \left( \frac{C_{TL}}{C_{BL}} \left  \frac{C_{TR}}{C_{BR}} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \left  \frac{\widehat{C}_{TR}}{\widehat{C}_{BR}} \right) \wedge \neg (n(A_R) < n(A)) \right. \right.$		
$2,3  \left\{ \left( \frac{C_{TL}}{C_{BL}} \left  \frac{C_{TR}}{C_{BR}} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \left  \frac{\widehat{C}_{TR}}{A_R^T A_R + \widehat{C}_{BR}} \right) \wedge \neg (n(A_R) < n(A)) \right\} \right\}$	2	$\left\{ egin{array}{c c} \left( rac{C_{TL}}{C_{BL}} \left  rac{C_{TR}}{C_{BR}}  ight) = \left( rac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \left  rac{\widehat{C}_{TR}}{\widehat{C}_{BL}}  ight  A_R^T A_R + \widehat{C}_{BR} \end{array}  ight)$
$\left( \begin{array}{c c} C_{BL} & C_{BR} \end{array} \right)  \left( \begin{array}{c c} \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) $		endwhile
1b $\{[C] = \operatorname{syrk\_ac}(A, \widehat{C})$	2,3	$\left\{ \left( \frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BL} \end{vmatrix} A_R^T A_R + \widehat{C}_{BR} \right) \land \neg (n(A_R) < n(A)) $
	1b	$\{[C] = \operatorname{syrk\_ac}(A, \widehat{C})$

Step	Algorithm: $[C] := \text{SYRK\_AC\_BLK\_VAR3}(A, C)$
1a	$\{C = \widehat{C}$
4	$A \to \left( A_L \middle  A_R \right), C \to \left( \frac{C_{TL} \middle  C_{TR}}{C_{BL} \middle  C_{BR}} \right)$
	where $A_R$ has 0 columns, $C_{BR}$ is $0 \times 0$
2	$\left\{ \left( \frac{C_{TL}}{C_{BL}} \middle  \frac{C_{TR}}{C_{BR}} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \middle  \frac{\widehat{C}_{TR}}{\widehat{C}_{BL}} \middle  A_R^T A_R + \widehat{C}_{BR} \right) \right\}$
3	while $n(A_R) < n(A)$ do
2,3	$\left\{ \left( \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left( \begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \wedge n(A_R) < n(A) \right\}$
	Determine block size $b$
5a	$\left( A_{L} \middle  A_{R} \right) \to \left( A_{0} \middle  A_{1} \middle  A_{2} \right), \left( \frac{C_{TL}}{C_{BL}} \middle  C_{TR} \atop C_{BR} \right) \to \left( \frac{C_{00}}{C_{10}} \middle  C_{01} \middle  C_{02} \atop C_{20} \middle  C_{21} \middle  C_{22} \right)$
	where $A_1$ has $b$ columns, $C_{11}$ is $b \times b$
6	
8	
7	
5b	$ \left( \begin{array}{c c c} A_L & A_R \end{array} \right) \leftarrow \left( \begin{array}{c c c} A_0 & A_1 & C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left( \begin{array}{c c c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right) $
2	$\left\{ \begin{array}{c c} \left( \frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} C_{BR} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BL} \end{vmatrix} A_R^T A_R + \widehat{C}_{BR} \right) \right\}$
	endwhile
2,3	$\left\{ \left( \frac{C_{TL}}{C_{BL}} \left  \frac{C_{TR}}{C_{BR}} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \left  \frac{\widehat{C}_{TR}}{\widehat{C}_{BL}} \right  \wedge \neg (n(A_R) < n(A)) \right\} \right\}$
1b	$\{[C] = \operatorname{syrk\_ac}(A, \widehat{C})$

		_
Step	Algorithm: $[C] := \text{SYRK\_AC\_BLK\_VAR3}(A, C)$	
1a	$\{C=\widehat{C}$	}
4	$A \to \begin{pmatrix} A_L & A_R \end{pmatrix}$ , $C \to \begin{pmatrix} C_{TL} & C_{TR} \\ C_{BL} & C_{BR} \end{pmatrix}$ where $A_R$ has 0 columns, $C_{BR}$ is $0 \times 0$	
2	$ \left\{ \left( \frac{C_{TL}}{C_{BL}} \middle  C_{TR} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \middle  \frac{\widehat{C}_{TR}}{\widehat{C}_{BL}} \middle  A_R^T A_R + \widehat{C}_{BR} \right) \right. $	
3	while $n(A_R) < n(A)$ do	
2,3	$ \left\{ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left( \begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \wedge n(A_R) < n(A) $	
	Determine block size $b$	
5a	$ \left( \begin{array}{c c} A_L & A_R \end{array} \right) \to \left( \begin{array}{c c} A_0 & A_1 & A_2 \end{array} \right)  ,  \left( \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \to \left( \begin{array}{c c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right) $	
	where $A_1$ has $b$ columns, $C_{11}$ is $b \times b$	_
6	$\left\{ \begin{array}{c c c} C_{00} & C_{01} & C_{02} \\ C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right) = \left( \begin{array}{c c c} C_{00} & C_{01} & C_{02} \\ C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & A_2^T A_2 + \widehat{C}_{22} \end{array} \right)$	
8		
7		
5b	$ \left( \begin{array}{c c c} A_L & A_R \end{array} \right) \leftarrow \left( \begin{array}{c c c} A_0 & A_1 & A_2 \end{array} \right), \left( \begin{array}{c c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left( \begin{array}{c c c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right) $	
2	$ \left\{ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left( \begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) $	
	endwhile	
2,3	$\left\{ \left( \frac{C_{TL}}{C_{BL}} \middle  C_{TR} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \middle  \widehat{C}_{TR} \right) \land \neg (n(A_R) < n(A)) \right\}$	
1b	$\{[C] = \operatorname{syrk\_ac}(A, \widehat{C})$	}

Step	Algorithm: $[C] := \text{SYRK\_AC\_BLK\_VAR3}(A, C)$
1a	$\{C = \widehat{C}\}$
4	$A \to \left( \begin{array}{c c} A_L & A_R \end{array} \right), C \to \left( \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right)$ where $A_R$ has 0 columns, $C_{BR}$ is $0 \times 0$
2	$ \left\{ \left( \frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BL} \end{vmatrix} A_R^T A_R + \widehat{C}_{BR} \right) \right\} $
3	while $n(A_R) < n(A)$ do
2,3	$\left\{ \begin{array}{c c} \left( \frac{C_{TL}}{C_{BL}} \middle  C_{TR} \\ C_{BL} \middle  C_{BR} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \middle  \widehat{C}_{TR} \\ \widehat{C}_{BL} \middle  A_R^T A_R + \widehat{C}_{BR} \right) \wedge n(A_R) < n(A) \end{array} \right\}$
	Determine block size b
5a	$\left(\begin{array}{c c} A_L & A_R \end{array}\right) \to \left(\begin{array}{c c} A_0 & A_1 & A_2 \end{array}\right) , \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \to \left(\begin{array}{c c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array}\right)$
	where $A_1$ has $b$ columns, $C_{11}$ is $b \times b$
6	$\left\{ \begin{array}{c c c} C_{00} & C_{01} & C_{02} \\ C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right) = \left( \begin{array}{c c c} C_{00} & C_{01} & C_{02} \\ C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & A_2^T A_2 + \widehat{C}_{22} \end{array} \right)$
8	
7	$\left\{ \begin{array}{c c c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ C_{20} & C_{21} & C_{22} \end{array} \right) = \left( \begin{array}{c c c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & A_1^T A_1 + \widehat{C}_{11} & A_1^T A_2 + \widehat{C}_{12} \\ C_{20} & C_{21} & A_2^T A_2 + \widehat{C}_{22} \end{array} \right)$
5b	$ \left( \begin{array}{c c c} A_L & A_R \end{array} \right) \leftarrow \left( \begin{array}{c c c} A_0 & A_1 & A_2 \end{array} \right), \left( \begin{array}{c c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left( \begin{array}{c c c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right) $
2	$\left\{ \begin{array}{c c} \left( \frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} C_{BR} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BL} \end{vmatrix} A_R^T A_R + \widehat{C}_{BR} \right) \right\}$
	endwhile
2,3	$\left\{ \left( \frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BL} \end{vmatrix} A_R^T A_R + \widehat{C}_{BR} \right) \land \neg (n(A_R) < n(A)) $
1b	$\{[C] = \operatorname{syrk\_ac}(A, \widehat{C})$ }

Step	Algorithm: $[C] := \text{SYRK\_AC\_BLK\_VAR3}(A, C)$
1a	$\{C = \widehat{C}\}$
4	$A \to \left( \begin{array}{c c} A_L & A_R \end{array} \right), C \to \left( \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right)$ where $A_R$ has 0 columns, $C_{BR}$ is $0 \times 0$
2	$ \left\{ \left( \frac{C_{TL} \mid C_{TR}}{C_{BL} \mid C_{BR}} \right) = \left( \frac{\widehat{C}_{TL} \mid \widehat{C}_{TR}}{\widehat{C}_{BL} \mid A_R^T A_R + \widehat{C}_{BR}} \right) \right\} $
3	while $n(A_R) < n(A)$ do
2,3	$ \left\{ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left( \begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \wedge n(A_R) < n(A) $
	Determine block size $b$ $ \begin{pmatrix} C_{00} & C_{01} & C_{02} \end{pmatrix}$
5a	$\left(\begin{array}{c c} A_L & A_R \end{array}\right) \to \left(\begin{array}{c c} A_0 & A_1 & A_2 \end{array}\right)  ,  \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \to \left(\begin{array}{c c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array}\right)$
	where $A_1$ has $b$ columns, $C_{11}$ is $b \times b$
6	$\left\{egin{array}{c c c} C_{00} & C_{01} & C_{02} \ C_{10} & C_{11} & C_{12} \ \hline C_{20} & C_{21} & C_{22} \end{array} ight) = \left(egin{array}{c c c} C_{00} & C_{01} & C_{02} \ \hline C_{10} & C_{11} & C_{12} \ \hline C_{20} & C_{21} & A_2^T A_2 + \widehat{C}_{22} \end{array} ight)$
8	$C_{12} = A_1^T A_2 + C_{12}$ $C_{11} = A_1^T A_1 + C_{11}$
7	$\left\{ \begin{array}{c c c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ C_{20} & C_{21} & C_{22} \end{array} \right) = \left( \begin{array}{c c c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & A_1^T A_1 + \widehat{C}_{11} & A_1^T A_2 + \widehat{C}_{12} \\ C_{20} & C_{21} & A_2^T A_2 + \widehat{C}_{22} \end{array} \right)$
5b	$\left( \begin{array}{c c c} A_L & A_R \end{array} \right) \leftarrow \left( \begin{array}{c c c} A_0 & A_1 & A_2 \end{array} \right), \left( \begin{array}{c c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left( \begin{array}{c c c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right)$
2	$\left\{ \begin{array}{c c} \left( \frac{C_{TL}}{C_{BL}} \left  \frac{C_{TR}}{C_{BR}} \right) = \left( \frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \left  \frac{\widehat{C}_{TR}}{\widehat{C}_{BL}} \right  A_R^T A_R + \widehat{C}_{BR} \right) \right\}$
	endwhile
2,3	$ \left\{ \left( \frac{C_{TL} \mid C_{TR}}{C_{BL} \mid C_{BR}} \right) = \left( \frac{\widehat{C}_{TL} \mid \widehat{C}_{TR}}{\widehat{C}_{BL} \mid A_R^T A_R + \widehat{C}_{BR}} \right) \land \neg (n(A_R) < n(A)) \right\} $
1b	$\{[C] = \operatorname{syrk\_ac}(A, \widehat{C}) $

Algorithm: $[C] := \text{SYRK\_AC\_BLK\_VAR3}(A, C)$
$A  o \left( A_L \middle  A_R \right), C  o \left( \frac{C_{TL} \middle  C_{TR}}{C_{BL} \middle  C_{BR}} \right)$
where $A_R$ has 0 columns, $C_{BR}$ is $0 \times 0$
while $n(A_R) < n(A)$ do
Determine block size $b$
$\left(\begin{array}{c c} A_{L} & A_{R} \end{array}\right) \to \left(\begin{array}{c c} A_{0} & A_{1} & A_{2} \end{array}\right) , \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \to \left(\begin{array}{c c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array}\right)$
where $A_1$ has $b$ columns, $C_{11}$ is $b \times b$
$C_{12} = A_1^T A 2 + C_{12}$
$C_{11} = A_1^T A_1 + C_{11}$
$ \left( \begin{array}{c c c} A_L & A_R \end{array} \right) \leftarrow \left( \begin{array}{c c c} A_0 & A_1 & A_2 \end{array} \right) , \left( \begin{array}{c c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left( \begin{array}{c c c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right) $
endwhile

Algorithm:  $[C] := SYRK\_AC\_BLK\_VAR3(A, C)$ 

$$A \to \left( A_L \mid A_R \right), C \to \left( \frac{C_{TL} \mid C_{TR}}{C_{BL} \mid C_{BR}} \right)$$

where  $A_R$  has 0 columns,  $C_{BR}$  is  $0 \times 0$ 

while  $n(A_R) < n(A)$  do

Determine block size b

$$\left( \begin{array}{c|c|c} A_L & A_R \end{array} \right) \to \left( \begin{array}{c|c|c} A_0 & A_1 & A_2 \end{array} \right) \, , \, \left( \begin{array}{c|c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \to \left( \begin{array}{c|c|c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right)$$

where  $A_1$  has b columns,  $C_{11}$  is  $b \times b$ 

$$C_{12} = A_1^T A 2 + C_{12}$$

$$C_{11} = A_1^T A_1 + C_{11}$$

$$\left( A_{L} \middle| A_{R} \right) \leftarrow \left( A_{0} \middle| A_{1} \middle| A_{2} \right), \left( \frac{C_{TL}}{C_{BL}} \middle| C_{BR} \right) \leftarrow \left( \frac{C_{00}}{C_{10}} \middle| C_{01} \middle| C_{02} \right)$$

endwhile